COMPARISION STUDY BETWEEN OPEN TRANSINGUINAL PREPERITONEAL HERNIA REPAIR AND LICHENSTEIN'S HERNIA REPAIR

Dissertation submitted

To

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI

With partial fulfillment of the regulations for the award of the degree of

M.S (General Surgery)

Branch-I

Government Kilpauk Medical College

Chennai- April -2016

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled "**COMPARISION STUDY BETWEEN OPEN TRANSINGUINAL PREPERITONEAL HERNIA REPAIR AND LICHENSTEIN'S HERNIA REPAIR"** is a bonafide and genuine research work carried out by me under the guidance of Prof. Dr.P.N.Shanmugasundaram M.S, HOD, Department of General Surgery, Kilpauk Medical College, Chennai-10.

This dissertation is submitted to **THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY CHENNAI** in partial fulfillment of the degree of M.S. General Surgery examination to be held in **April 2016**.

Date:

Place: **DR T.PAULIA DEVI**

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CERTIFICATE OF APPROVAL

The Institutional Ethical Committee of Govt. Kilpauk Medical College, Chennai reviewed and discussed the application for approval "Comparison study between Open Transinguinal Preperitoneal hernia repair and Lichenstein' hernia repair"-For Project Work-submitted by Dr.T.Paulai Devi, MS (General Surgery), PG Student, KMC, Chennai-10.

The Proposal is APPROVED.

The Institutional Ethical Committee expects to be informed about the progress of the study any Adverse Drug Reaction Occurring in the Course of the study any change in the protocol and patient information /informed consent and asks to be provided a copy of the final report.

20/1/15

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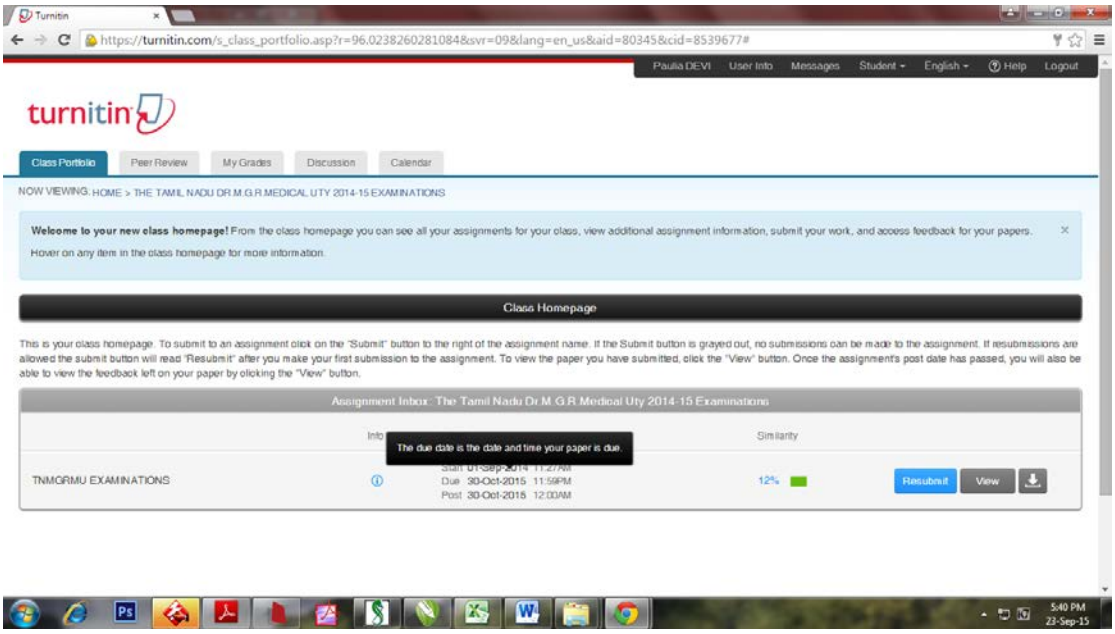
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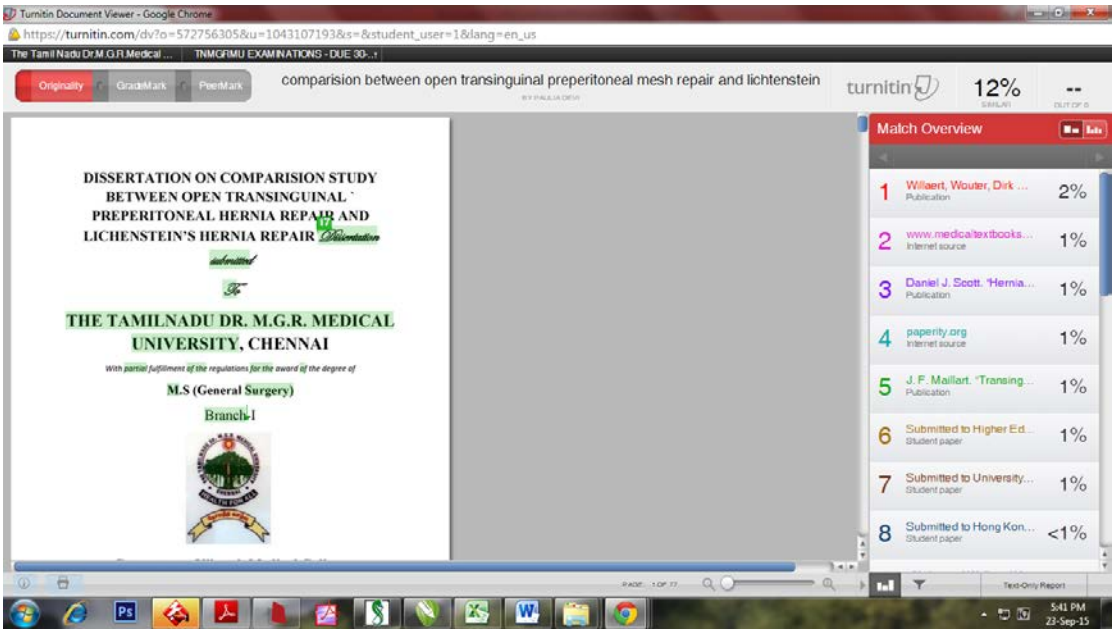
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on

“Comparison study between open transinguinal Preperitoneal hernia repair and Lichtenstein’s repair’’

During her course in M.S. General Surgery from JANUARY 2015 to JUNE 2015 at Government Kilpauk Medical College, Chennai-10.

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CERTIFICATE BY THE GUIDE

This is to certify that the dissertation titled **"Comparison study between open transinguinal Preperitoneal hernia repair and Lichtenstein's repair"** is a bonafide research work done by **Dr.T.PAULIA DEVI**, post graduate in M.S. General Surgery, Kilpauk Medical College, Chennai-10 under my direct guidance and supervision in my satisfaction, in partial fulfillment of the requirements for the degree of **M.S. General Surgery**.

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This study would have not been possible without the support of my Associate Prof. Dr. V. Vijayalakshmi M.S, D.G.O and also my Unit Assistants, Dr. P. Mathusoothanan, M.S, Dr. K. Sridevi M.S, Dr. M. Senthil Kumar M. S, and also my former Asst. Dr. P. Chelladurai, M.S, to whom I owe my surgical learnings.

Place: Chennai

Date: Dr. T.PAULIA DEVI

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ABTRACT

“COMPARISON STUDY BETWEEN TRANSINGUINAL PRE PERITONEAL MESH REPAR AND LICHTENSTEIN’S REPAIR

By DR.PAULIA DEVI
GUIDE BY PROF.P.N.SHANMUGASUNDARAM MS

ASST.MATHUSOOTHANAN MS.
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Subject Category : SURGICAL TECHNIQUE

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Keywords : Inguinal hernia, Inguinal prosthetic prolene mesh

Abstract

The preperitoneal repair of an inguinal hernia (IH),performed by a classical anterior transinguinal approach is a simple and safe procedure, particularly indicated in case of evident weakness of the trasversalis fascia (TF).

Introduction

In the recent years, the use of a prosthesis in the treatment of an IH has gained a widespread acceptance; different techniques are employed, placing the prosthetic mesh anteriorly, or behind the conjoined tendon in the preperitoneal space(1).
Generally the basic principles and indications of the preperitoneal procedure are not adequately considered in the training of young surgeons. The aim of this paper is to recall attention to this subject.

Methods

Our experience of preperitoneal inguinal prosthetic repair includes 25 cases, operated in the years jan 2015-june2015 out of a total number of 25 operations for inguinal repair. There were 13 cases of indirect hernia, 12 direct.. All the operations have been performed monolaterally surgery done under spinall anaesthesia. The follow-up was continued up to 3 month.we also performed lichtenstein's repair for 25 cases.

-Classical inguinal incision between the antero-superior iliac spine and the pubic tubercle, dividing the external oblique fascia and the external ring and mobilizing the cord. The ilioinguinal nerve is gently isolated from the posterior inguinal wall. The external oblique fascia is largely cleaved from the conjoined tendon.

-In case of indirect hernia, the sac, carefully separated from the cord well beyond the internal ring, is reduced in the peritoneal cavity. In case of firm adhesion with the tunica vaginalis, it can be transacted in its middle part, leaving open the distal.

-When present a direct hernia, its sac is trimmed off the TF.

-At this moment, the decision for a preperitoneal repair is based on the conditions of the posterior inguinal wall: enlargement of the internal orifice, presence of a double IH, direct and indirect, global weakness of the TF.

-In this case, the TF is opened from the internal orifice to the pubic tubercle, respecting the epigastric vessels.

- The subsequent dissection of the preperitoneum is extended laterally beyond the internal orifice, inferiorly to the Cooper's ligament, and medially to the external border of the rectus sheath.

-A synthetic mesh, usually of polypropylene, rectangular in shape and of about 15 x 7cm in size, is prepared to cover all the dissected preperitoneal area, including the Bogros'space and the Fruchaud's myopectineal orifice . An adequate slit is made in its superior border, to create a new internal ring and allow free passage of the cord.

-The mesh, placed underneath the conjoined tendon, is anchored medially to the rectus abdominis sheath, inferiorly to the Cooper's, and laterally to the inguinal ligament. In this way care is taken not to damage the iliohypogastric nerve in its possible intramuscular course. The two tails of the new created internal orifice in the prosthesis are crossed behind the cord and laterally sutured to the internal oblique muscle .

-When possible, a new posterior musculo-aponeurotic inguinal wall is constructed approximating the edge of the conjoined tendon to the inguinal ligament. It helps to cover and isolate the mesh, and to prevent adhesions with the spermatic cord.

-The external oblique fascia is sutured to close the inguinal canal.

In our experience we have not observed any recurrence; in only 1 cases a transient inguinal pain was well controlled by a pharmacological treatment.

Discussion

The main characteristics of this technique are: adequate exposure of the preperitoneal space; hermetic closure, from inside the muscolo-aponeurotic wall, of all the possible sites of recurrence, inguinal,femoral and obturator; anchorage of the mesh to musculo-aponeurotic structures, preventing in this way its dislodgement or folding . We think that the construction of a new internal orifice avoids the long dissection of the cord, necessary in case of its parietalisation with subsequent risk of damage and entrapment of its nervous structures.
The preperitoneal dissection is usually easy to accomplish, except in case of local scarring, as after iliac lymphadenectomy, or vascular approach to the external iliac artery. These two conditions are a contraindication to this technique.
Clearly, the above described procedure combines the advantages of the preperitoneal placement of the prothesis with the easy open anterior inguinal approach.
Comparing this technique with others more commonly used and based on the anterior placement of the prosthesis, characteristically that of Lichtenstein, some differences are evident:
-minor possibility of recurrence, inguinal and especially femoral;
-the deep preperitoneal lodgement of the mesh protects against infections from the superficial planes of the wound;
-the abdominal pressure helps the mesh to adhere to the muscolo-aponeurotic structures of the whole inguinal region, that constitute a strong barrier against its anterior bulging or displacement;
-the preperitoneal location of the prosthesis resumes the position and the function of the TF, also before its colonization by the new–produced connective tissue;
-the TF, clearly weak, is completely replaced, rather than only reinforced, as in the anterior disposition of the prosthesis.
The anterior placement of the mesh, typically the Lichtenstein's operation, is applied more largely than the preperitoneal repair: . It requires a more limited dissection, also permitting a good reinforcement of the posterior inguinal wall through a simpler anterior approach, and finds its principal indication when the TF can be still recognized as a preserved anatomical plane.

Conclusion(s)

The surgical correction of an IH requests a good anatomical dissection and an accurate evaluation of the conditions of the whole inguino-femoral region, in order to choose the best technique of reconstruction compared with lichtenstein repair,pre peritoneal repair [using prolene mesh] is best method to deal about inguinal,femoral and obturator hernia.

In our experience, the repair of groin hernias with Preperitoneal mesh(Prolene mesh through an inguinal incision) has resulted in greater patient comfort with reduced post operative pain and also decreased number of complications. Although there was no recurrence observed in my study,the follow up period was only minimal (average 3 month). The duration of stay in the hospital was reduced and the patients had a rapid return to work.

Hence the transinguinal pre peritoneal mesh repair is an amazing simplistic technique which gives an approach to inguinal, femoral and obturator hernias and bears the same anatomical relationship in TEP and TAPP approaches which gives a better understanding of the TEP and TAPP procedures.It is an easy technique with short learning curve.The risk of vessel injury is less in the hands of an expert. The contact of mesh with the cord structures and nerve is minimal which reduces the postoperative cord oedema, pain (Inguinodynia), orchitis and sensory loss.

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INTRODUCTION

100 years ago, Bassini described the first herniorrhaphy. They believed immobilization and bed rest enhanced wound healing. But it turned out to be the culprit for genesis of fatal pulmonary embolism. Hence early ambulation was suggested.

This study is done to prove the fact that Trans Inguinal Preperitoneal (TIPP) Hernia Repair (using prolene mesh) resulted in greater patient comfort with reduced post operative pain and also decreases the number of complications and recurrence rate and that it can be recommended for all primary unilateral Inguinal Hernias.

More than 7 lakh inguinal hernia repairs were performed each year in US in 1980. More than 70,000 patients developed recurrent hernia due to excessive tension repair which was then replaced with Lichtenstein’s tension free mesh repair. But due to chronic post operative pain, sensory loss, cord oedema, Trans Inguinal Pre Peritoneal repair was tried which proved to be useful.

HISTORY OF TREATMENT OF INGUINAL HERNIA

(The History of hernia is the history of surgery)

Since the beginning of surgical history, treatment of hernia has evolved through different stages.

The Latin word hernia means rupture / tear

The Greek word hernia means bulge / budding

ANCIENT TIMES

The oldest scientific book, The EDWIN SMITH SURGICAL PAPYRUS, that deals with surgery, during the Egyptian Kingdom (3000 – 2500 BC) contains observations on hernias:**[2]**

(When you see a swelling on the abdomen……when come out …….caused by coughing)

Heliodorus (sun's gift) who did the first hernia surgery separated the hernial sac from the cord, but did not touch the tesicles. In 25 BC TO 50 AD Aulus Cornelius Celsus was the first medical writer. In his book he discussed groin anatomy and the pathology and causes of hernias.

In AD 200, Galen said that peritoneal tear is the etiology of herniation.

MIDDLE AGES (DARK AGES)

Period of time between the fall of the Roman Empire, the beginning of the Italian Renaissance (15th Century).

In this period, surgery was performed by cutters, barber's scissors.

In the 4th century Oribasius performed herniotomies.

In the 6th century AD, hernia was treated with a plastic, a bandage and a prayer.

AD (625-90) Pool of Aegina, Egypt performed hernia surgery using double liganon & excision of the cord, sac & testicles.

THE RENAISSANCE

Ambroise pare described the uses of TRUSSES for the control of hernia.One of his greatest contributions was the ligature of vessels,which supplanted the method of hemostasis by the use of hot oil.

In the 16th century , in ceremony kasper stomayr was a cutter of hernia in 1589, he described the difference between Direct & indirect hernias.

Castration was sanctioned in surgery of indirect hernia but not for the other types.

In 1651-1714 Jacques performed >2000 hernia repairs.

THE POST RENAISSANCE ERA

Antonica Scarpa (1752 – 1832) described the sliding hernia.

In 1844, Cooper described the role of Superior Pubic Ligament (cooper's ligament) and the fascia transversalis in the pathogenesis of hernias

THE 19th& 20th CENTURIES

Edoardo Bassini (1844 – 1924) "Father of Modern Herniorrhaphy" Bassini's repair consists of the high ligation & removal of the hernia sac followed by reconstruction of the floor using internal oblique, transversalis fascia, a triple layer triple layer of fascia transversalis that is supported to inguinal ligament with the cordcovered by external oblique aponeurosis.

The shouldice repair is a modern revival of the original Bassini repair started in 1953.

In the US, Marcy 1837-1929, Halsted (1852-1922) and Fergusson described technique similar to the Bassini repair.

In 1892, Marcy described the high ligation of hernia sac and closure of the dilated deep ring as important steps in the inguinal hernia repair.

1852-1922 Stowarr Halsted, reported 2 types of herniorrhaphy, In Halsted I the cord is under the skin and in Halsted II the cord is under the repair.

In 1890 Halsted started the modern relaxing incision over rectus sheath

In 1898 Cooper's ligament repair was described by George Lotheissen, which was popularized by Mcvay (1911-87).

CONTEMPORARY TIMES

Harvey Cushing used local anesthesia for hernia using Cocaine Infiltration.

In 1920, Cheatle performed the first preperitoneal procedure.

In 1936 Henry did a high closure of the sac and fascial preperitoneal repair.

In 1952 Irvine Lichtenstein described tension free mesh repair.

In 1982 Ger performed an indirect inguinal hernia repair laparoscopically, closing the defect with Michel staple clips.

In 1989 Lichtenstein and colleagues performed 1000 hernioplasties, in which reconstruction of the floor of inguinal canal was by the synthetic mesh.

In 1990 Popp placed a dual patch over the defect of an inguinal indict hernia.

In 1991 Arregui introduced Trans Abdominal Preperitoneal repair (TAPP).

Cheatle- Henry procedure which is a preperitoneal surgery for inguinofemoral herniation is also known as the Nyhus procedure.

REVIEW OF LITERATURE

ANATOMY OF THE INGUINAL CANAL

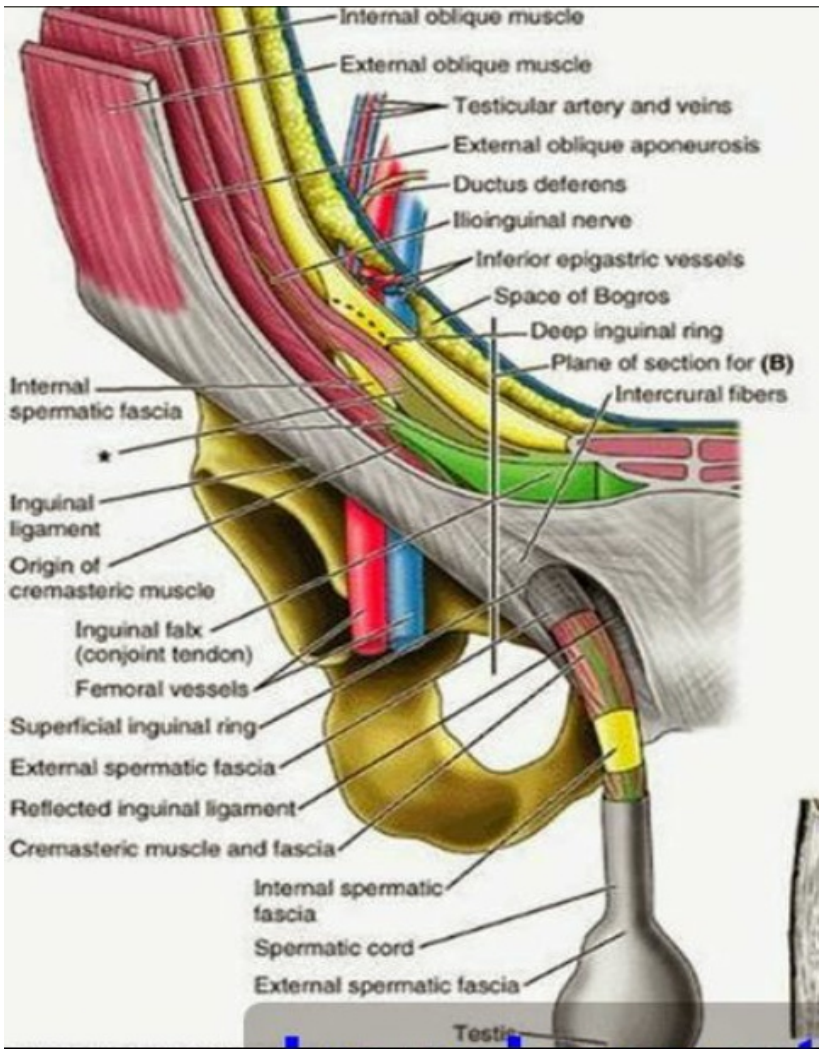


Figure:1- ANATOMY OF THE INGUINAL CANAL

DEFINITION: The inguinal canal is an oblique rift about 4cm long lying above the medial half of the inguinal ligament. It commences at the deep ring and ends at the superficial ring and transmits the spermatic cord (round ligament in female) and the ilio inguinal nerve.

ANTERIOR WALL

It is formed by the external oblique aponeurosis assisted most laterally by internal oblique muscle.

EXTERNAL RING

This is a triangular – shaped opening of the external oblique aponeurosis, the base is formed by the pubic crest, the margins formed by 2 crura, superior crus is attached with rectus sheath, the inferior crus is attached with the pubic tubercle.

POSTERIOR WALL (FLOOR)

It is formed by aponeurosis of the transversis abdominis muscle and the transversalis fascia.

INTERNAL RING

This is a inverse U shaped defect in the transversalis fascia corresponding to the middle of the inguinal ligament.

SUPERIOR (ROOF)

It is formed by the arched fibers of internal oblique muscle and transversalis abdominis muscle and aponeurosis.

INFERIOR (FLOOR)

It is formed by inguinal ligament assisted medially by the Lacunar Ligament which fills the angle between the inguinal ligament and Pectineal line.

- The lower most fibers of the transversalis, internal oblique are supplied by the ilioinguinal and iliohypogastric nerves.

- So division of the ilioinguinal nerve (eg: muscle cutting incision for appendicectomy) leads to a direct inguinal hernia.

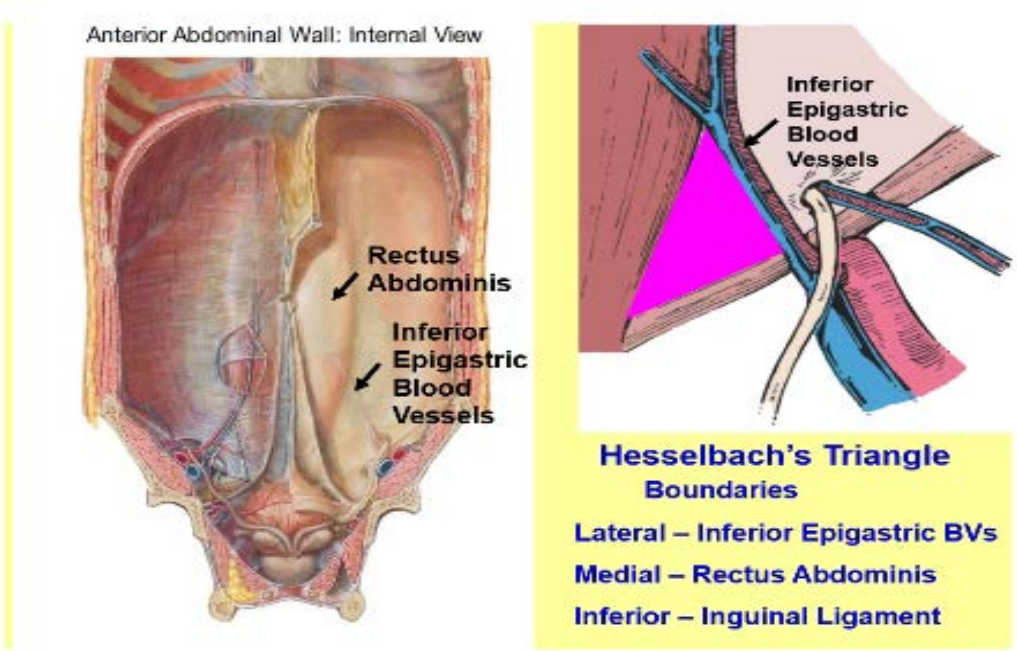


Figure:2 - HESSELBACH'S TRIANGLE

HASSELBACH'S TRIANGLE

It is bounded laterally by inferior epigastric vessels, medially by the lateral edge of the rectus abdominis muscle and below by the inguinal ligament.

DIRECT AND INDIRECT HERNIA

Hernial sac passing through the Hasselbach's triangle is direct hernia; hernial sac passing lateral to inferior epigastric artery is called indirect inguinal hernia.

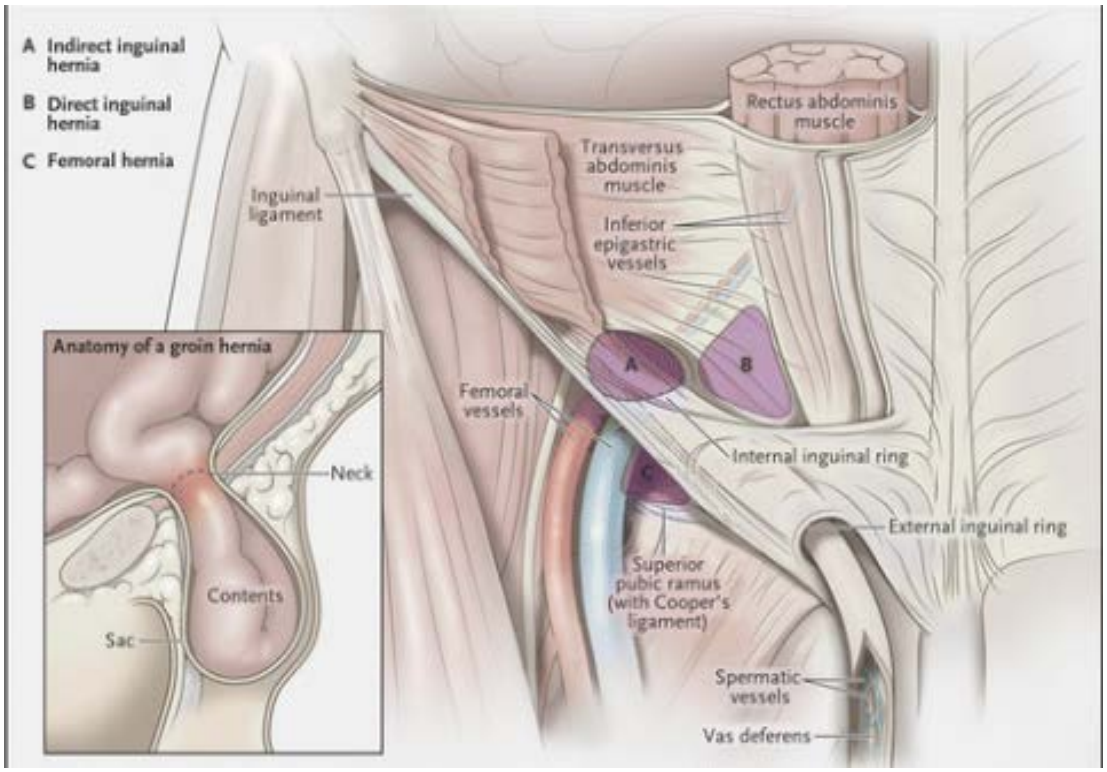


Figure:3 - DIRECT, INDIRECT AND FEMORAL HERNIA

FEMORAL CANAL

This is a enclosed space just medial to the femoral vein,which contains fat and some lymph node(node of Cloquet).

FEMORAL HERNIA

Protrusion of viscus or preperitoneal sac through the femoral canal is termed femoral hernia. The walls of femoral hernia are formed by the inguinal ligament anteriorly,the femoral vein laterally,the pubic bone covered by the iliopectineal ligament posteriorly and the lacunarligament medially. This is a strong curved ligament with a sharp unyielding edge which impedes reduction of a femoral hernia.

It is more common in low-weight, elderly females (because of the increase in size of femoral canal in female)

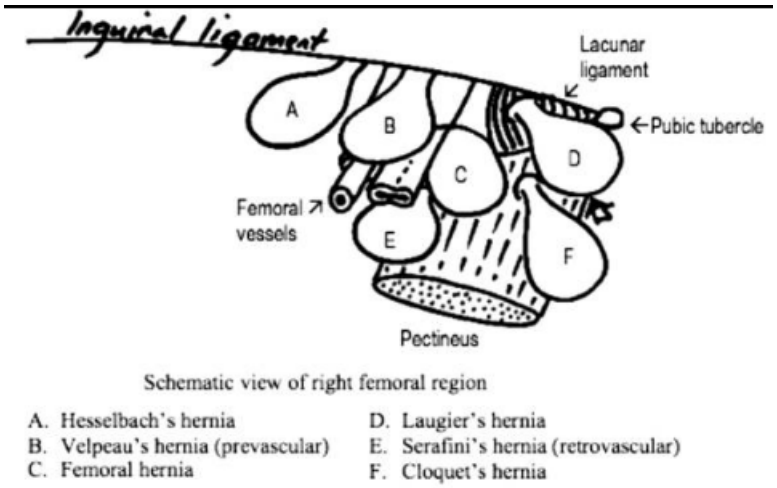
Easily missed on examination

50% of cases present as an emergency with high risk of strangulation.

Variants of femoral hernia

1. **Velpeau hernia: hernia sac lies in front of the femoral vessels**
2. **Narath's hernia: hernia lies behind the femoral vessels, usually associated with congenital dislocation of hip**

3. **Serafini's hernia: behind the femoral vessels.**



Schematic view of right femoral region

A. Hesselbach's hernia
B. Velpeau's hernia (prevascular)
C. Femoral hernia
D. Laugier's hernia
E. Serafini's hernia (retrovascular)
F. Cloquet's hernia

Figure : 4 – VARIANT OF FEMORAL HERNIA

4. **Cloquet hernia: it lies under the fascia covering the pectineus muscle.**

5. **Laugier hernia: hernia through lacunar ligament**

6. **Beclard hernia: sac through the saphenous opening carrying the cribriform fascia**

Ideal timing for femoral hernia surgery – as soon as possible.

Principle of repair – suturing of inguinal ligament to Pectineal ligament after dealing with the sac

SURGERY FOR FEMORAL HERNIA

1. Low approach [Lockwood]-incision is made 1cm below the inguinal ligament,after reducing the sac,the neck of the sac is pulled down and ligated as high as possible. Femoral canal is closed with prolene by suturing the inguinal ligament to Iliopectineal line. Mesh is kept and anchored with prolene suture placed medially, superiorly and inferiorly.

2. Inguinal approach[Lotheissen] – here transversalis fascia is divided and sac is reduced and femoral ring is obliterated by suturing the conjoint tendon to the ilioinguinal line. Alternatively mesh is placed in the Preperitoneal space and anchored to Iliopectineal line.

3. High approach[McEvedy] – through a vertical incision parallel to outer border of rectus muscle, wound deepened until the extra peritoneal space is identified. After reducing the sac, neck is ligated, conjoint tendon is sutured to the Iliopectineal ligament with non absorbable suture. Prolene mesh may be kept sutured to the Iliopectineal ligament. Advantage of this technique is that if resection of the intestine is required, it can be easily carried out.

OBTURATOR HERNIA

Hernia passes through the obturator canal,more common in elderly female. Swelling in the scarpa’s triangle. It becomes more apparent if the limb is flexed,

abducted and rotated outwards. In strangulated obturator hernia,pain is referred to the knee through geniculate branch of obturator nerve. In per vaginal /per rectal examination it is felt as a tender swelling in the region of obturator foramen.

TREATMENT

1. Through laparotomy incision, close the defect with mesh plug.

2. Laparoscopic TAPP repair - to avoid nerve injury. Glue can be used to fix a mesh over the defect..

DERIVATIVES OF EOA

a) Inguinal ligament (Poupart's)

b) Lacunar ligament (Gimbernat's)

c) Reflected inguinal ligament (colle's)

d) Pectineal ligament (cooper's)

DERIVATIVES OF TRANSVERSALIS FASCIA

1) Both crura of deep ring

2) Ilio pubic tract

3) Part of cooper's ligament

4) Iliopectineal arch

SPACE OF RETZIUS

This is a retro pubic space between the parietal peritoneum and transversalis fascia.

SPACE OF BOGROS

Lateral extension of space of Retzius.

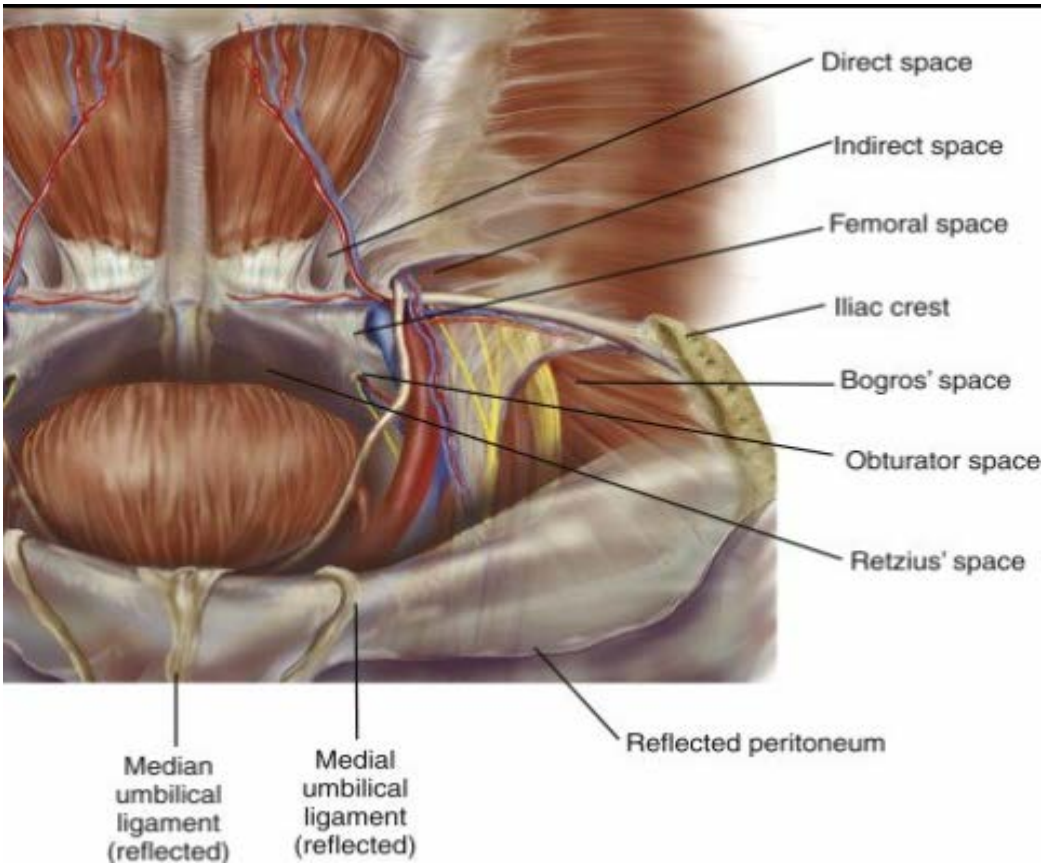


Figure: 5 - RETZIUS' AND BOGROS' SPACE

FRUCHAURD'S MYOPECTINEAL ORIFICE

Fruchaurd's concept in all groin hernias is failure of transversalis fascia. It is bounded superiorly by internal oblique and transversalis abdominis muscle, medially by the rectus muscle and rectus shealth, laterally by the iliopsoas muscle and inferiorly by the pectineal ligament.

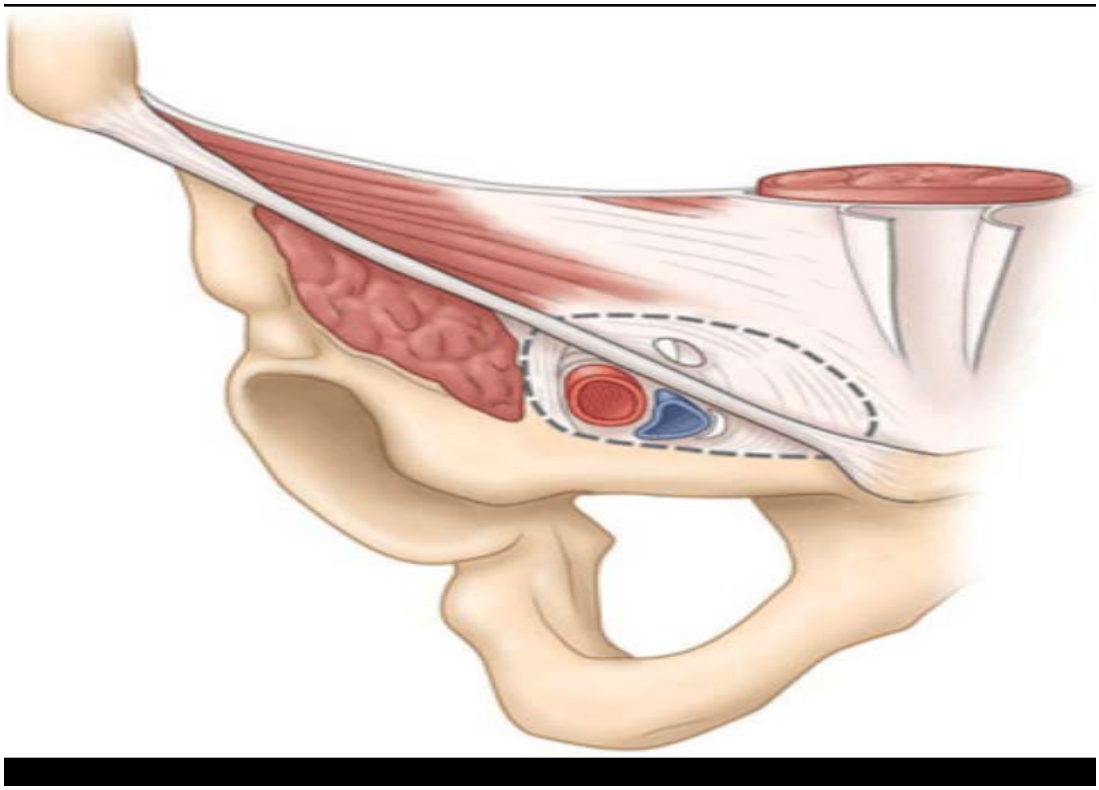


Figure: 6 - FRUCHAURD'S MYOPECTINEAL ORIFICE

SPERMATIC CORD

Passes through the inguinal canal.

Constituents of spermatic cord

It consists of:

1. The ductus deferens, which usually lies in the lower and posterior part of the cord.

2. 3-arteries, the largest of which is the testicular artery, with the artery to the ductus (from the superior or inferior vesical), and the cremasteric artery (from the inferior epigastric).

3. 3-Veins - the Pampiniform plexus of testicular vein, cremastric vein and vein to the vas deferens.

4. 3- Nerves:

    a) the genital branch of genitofemoral nerve to supply the cremaster muscle.

    b) ilioinguinal nerve.

    c) Sympathetic nerves (Testicular plexus).

5. Lymphatics – The veins of the some from the coverings iliac nodes.

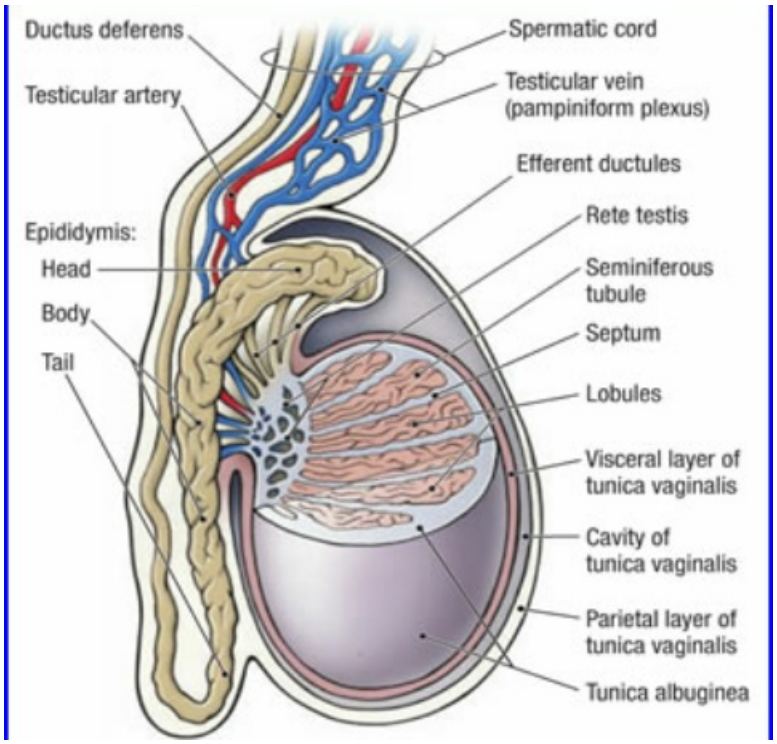


Figure:7 – SPERMATIC CORD

COVERINGS

a) External spermatic fascia from the external oblique fascia

b) Cremasteric fascia from the internal oblique muscle and fascia

c) Internal spermatic fascia from the transversalis fascia

TRIANGLE OF DOOM

Through laparoscopy we can see the triangle of Doom. It is formed by the spermatic vessels laterally and the vas medially, inferior flap of the peritoneal dissection inferiorly.

It contains :

1) External iliac vessels

2) Deep circumflex iliac vein

3) Genital branch of genitofemoral nerve.

During surgery, if these vessels are injured, the chance of mortality is high.

TRIANGLE OF PAIN

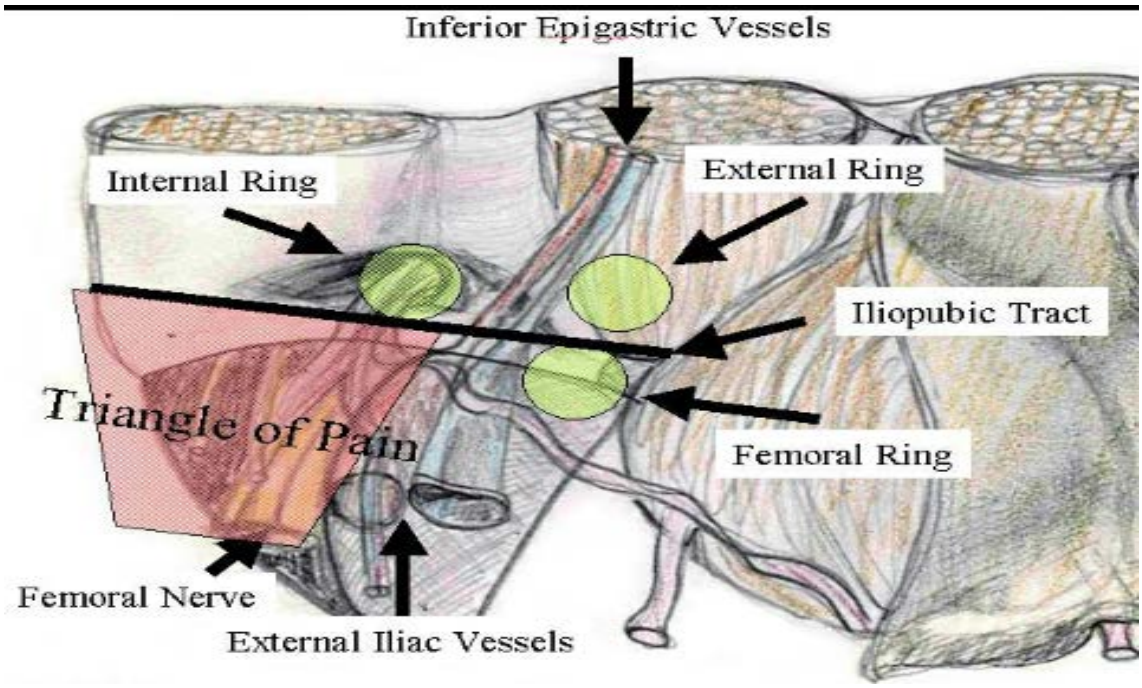


Figure:8- TRIANGLE OF PAIN

It is formed by the:

1) Spermatic vessels medially

2) Iliopobic tract laterally

It contains genitofemoral nerve, the femoral nerve and the lateral femoral cutaneous nerve of thigh. Any staples placed caudal to the iliopubic tract and lateral to the spermatic vessels result in neuralgia.

CORONA MORTIS (DEATH CROWN)

It refers to the vascular ring, which is formed by the anastomosis of an aberrant obturator artery and the normal obturator artery. During hernia surgery, injury to this anastomosis causes torrential bleeding.

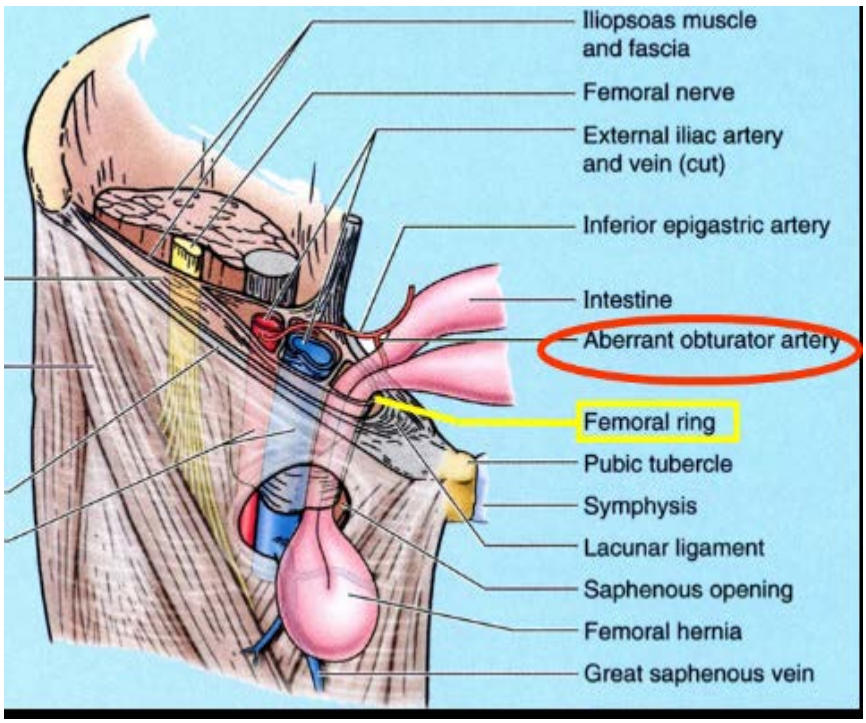


Figure: 9 - CORONA MORTIS

NERVES IN THE INGUINAL REGION

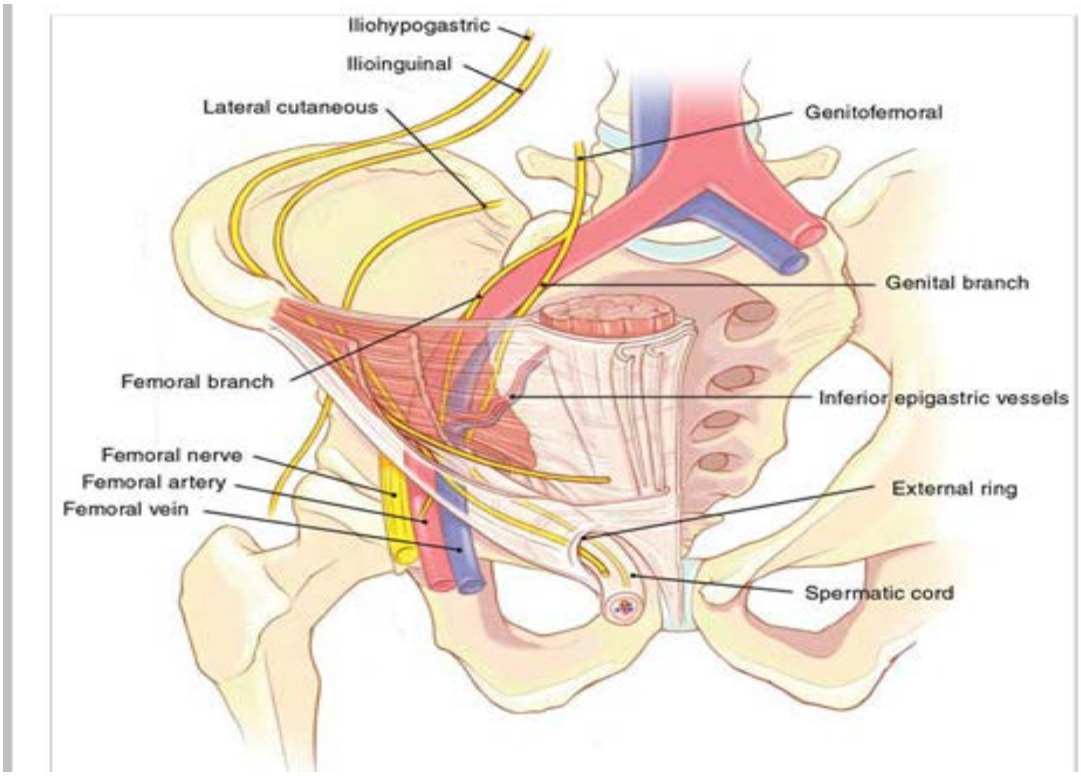


Figure: 10 - NERVES IN THE INGUINAL REGION

ILIOHYPOGASTRIC NERVE [T12-L1]

- Emerge lateral to the psoas muscle.
- Surface marking- 2cm medial to anterior superior iliac spine. It pierces the internal oblique muscle.
- Just above the external ring, it pierces the external oblique muscle.
- Sensory innervationto suprapubic region.
- Motor supply to the transverse abdominis.

1. ILIOINGUINAL NERVE [T12-L1]

- Itemerges lateral to the psoas muscle.
- Surface marking-near the iliac crest. It pierces the transverse abdominis muscle,near the deep ring it lies between ILM and EOM.
- Passes along the cord structure.
- Motor supply to the internal oblique muscle,sensory innervation to the root of penis,anterior part of the scrotum, mons pubis,labia majora.

2. GENITO FEMORAL NERVE [L2]

- Passes on the medial border of the psoas muscle.
- Crosses behind the ureter.
- Just above the inguinal ligament,it is divided into the femoral and genital branch.
- Sensory and motor components to the cremasteric muscle **[cremastericreflex].**
- Femoral branch-sensory innervations to the femoral triangle area.
- Genital branch enters into the inguinal canal through the deep ring.
- Sensory to the skin of scrotum, mons pubis,labia majora

3. LATERAL FEMORAL CUTANEOUS NERVE [L2-L3]

- Passes on the lateral border of the psoas,then passes on the iliacus.
- Finally it passes medial to the ASIS,then behind the iliopubic tract.
- Entrapment of this nerve is common in the region where it passes near inguinal ligament from abdomen to the thigh**[meralgia paraesthetica].**
- Sensory to the anterior and medial aspects of the thigh

4. FEMORAL NERVE (L2,L3,L4)

- It passes lateral to the iliac artery, deep to the inguinal ligament.
- Motor to iliacus,pectineus, sartorius,quadriceps,hip and knee joint.
- Sensory to the anterior and medial aspects of thigh, distal to genitofemoral nerve and medial to the lateral cutaneous nerve of thigh.
- Cutaneous branches are intermedial, medial and saphenous nerve.

MECHANISM OF INGUINAL CANAL

1) FLAP VALVE MECHANISM:

Increased intra abdominal pressure leads on to approximation of the anterior and posterior walls of the canal

2) The superficial ring is protected by the conjoint tendon inferiorly and the reflected part of the inguinal ligament superiorly

3) SHUTTER MECHANISM

As the transversalis abdominis and the inguinal oblique muscular contract, the roof is approximated to the floor like shutter.

4) BALL – VALVE MECHANISM

Contraction of the cremaster helps K-cord to plug the deep ring.

5) SLIT VALVE MECHANISM

Contraction of the external oblique leads to approximation of 2 crura of the superficial ring.

6) Hormones may play a role in maintaining the tone of the Inguinal Musculature.

ETIOLOGY OF HERNIA

1) Preformed Sac – Patent processus vaginalis – Congenital Indirect inguinal hernia.

2) Repeated high abdominal pressure due to constipation, excess coughing, prostatic symptoms and obesity.

3) Weakening of body muscle and tissues due to

a) Genetic weakness of collagen

b) Ageing and pregnancy

c) Structures entering and leaving the abdomen.

Eg: Femoral vessels – Femoral hernia

Obturator Nerve – Obturator Hernia

Sciatic Nerve – Sciatic Hernia.

THE EUROPEAN HERNIA SOCIETY CLASSIFICATION [1]

- Primary or Recurrent (P or R)
- Lateral, Medial or Femoral (L,M or F)
- Defect size in finger breadths assumed to the 1.5cm.
- Eg:A primary, direct, inguinal hernia with a 3cm defect would be PM2.

NYHUS CLASSIFICATION OF GROIN HERNIA

Based on the deep ring and posterior wall weakness

Type 1: Indirect hernia with normal deep ring

Type 2: Indirect hernia with dilated Deep ring

Type 3: Posterior wall defect

a) Direct hernia

b) Indirect with posterior wall weakness (Pantaloon hernia)

c) Femoral Hernia

Type 4: Recurrent hernia

CLINICAL FEATURES

1) Swelling in the inguinal region above the inguinal ligament, medial to pubic tubercle – Inguinal hernia

   Swelling below the inguinal ligament and lateral to the pubic tubercle – femoral hernia

2) Aching (or) heavy feeling

INVESTIGATION

1) Plain x-ray abdomen is not much useful.

2) USG – low cost, very useful in the early post operative period to differentiate a hematoma or seroma from an early recurrence.

3) MRI- useful in the diagnosis of sportsman's groin, also useful to differentiate an occult hernia from an orthopaedic injury.

4) Herniogram – to identify occult hernia/ not detectable clinically, may cause severe pain

5) Laparoscopy – to diagnose the occult contra lateral inguinal hernia.

6) CT Scan

ON EXAMINATION

Check for the:

1) Reducibility

2) Cough impulse

3) Tenderness and overlying skin colour changes

4) Content of hernia

DIFFERENTIAL DIAGNOSIS OF INGUINAL HERNIA

1) An encysted hydrocele of the cord

2) Spermatocele

3) Femoral Hernia

4) Undescended testis

5) Vaginal hydrocele

6) Lipoma of the cord

7) Infantile hydrocele

8) Ectopic testis

9) Psoas abscess

10) Psoas bursa

11) Enlarged lymph node

12) Saphena varix

13) Femoral aneurysm

IN FEMALES

1) Hydrocele of the canal of NUCK

2) Femoral hernia

DIFFERENTIAL DIAGNOSIS OF FEMORAL HERNIA

1) Inguinal hernia

2) Lymphadenopathy

3) Saphena Varix

4) Femoral artery aneurysm

5) Psoas abscess

6) Rupture of adductor longus with hematoma

TREATMENT

TRUSSES

Hernias can be controlled by suitably fitted trusses. But it may be uncomfortable and difficult to keep in place. It never prevents strangulation nor cures the hernia.

ANESTHESIA IN HERNIA SURGERY

General Anesthesia – INDICATIONS

Patients with localized skin infection in the back who are not suitable for spinal / epidural, spine deformity.

Regional anaesthesia – spinal and epidural anaesthesia offer a number of advantage for inguinal hernia repair. Postoperative nausea and vomiting are less common.patients are usually ready for discharge sooner after regional anaesthesia. Complications include urinary retention, post dural puncture headache, greater degree of muscle relaxation, pain.

Local Anesthesia

1) Nerve block method

2) Field block method

Using alkalinisation of 1% lignocaine with sodium bicarbonate will decrease the pain of injection. Infiltrated in area two finger breadth above and medial to ASIS, just proximal to the pubic bone using 0.5% lignocaine or 0.25% bupivacaine. The addition of adrenaline help to reduce the plasma concentration of local anaesthesia.

PRE OPERATIVE ASSESSMENT AND PREPARATION

1) Clinical Examination
2) Laboratory tests
3) Cardiovascular, pulmonary, renal function
4) Look for DM, HT
5) Stop smoking
6) Obese patients are advised to reduce weight before the operation.

TYPES OF SURGERY IN HERNIA

1) Herniotomy (Excision of sac)
2) Herniorrhaphy
3) Hernioplasty

HERNIOTOMY IN CHILDREN

MICHAELIS PLANK OPERATION – Through inguinal approach, high ligation of hernia sac is performed. Before ligating, one should ensure that the contents are reduced. Cut the sac distal to the ligation. Repair is not needed in children.

OTHER APPROACHES

1) Suprainguinal Preperitoneal open method
2) Transperitoneal laparoscopic method.

HERNIA SURGERY IN ADULTS:[3]

1) Herniorrhaphy (Strengthening of the posterior wall of inguinal canal)
    - Bassini
    - Shouldice
    - Dasarda
2) Hernioplasty – (Strengthening of the posterior wall by mesh)
    a) Open flat mesh repair – Lichtenstein
    b) Open Complex mesh repair
        - Plugs
        - Hernia Systems
    c) Open Preperitoneal Repair

- Stoppa
- Kugel’s

d) Laparoscopic Repair

- TEP
- TAPP

BASSINI (IN 1890)

Sutures are placed between the conjoint tendon above and the inguinal ligament below using non absorbable interrupted prolene sutures extending from the pubic tubercle to the deep ring. Medial most stitch is taken from the periosteum of pubic tubercle which is called as the KEY (or) BASSINI’S STITCH. In1887, Bassini originally used silk as the suture material

MODIFIED BASSINI

Here transversalis fascia is opened, triple layer of upper leaf which contains transversalis fascia, transversis abdominis and internal oblique muscle is sutured to the outer shelving edge of inguinal ligament.

DASARDA

1-2cm strip of external oblique aponeurosis lying over the inguinal canal is isolated but left attached both medially and laterally which is sutured to the

conjoint tendon and inguinal ligament, reinforcing the posterior wall of the inguinal canal.

SHOULDICE REPAIR (1930)

It was introduced by Shouldice in Toronto at Shouldice hernia clinic. It is a multilayered repair. Often cremasteric resection is done to have proper access to the posterior inguinal wall. After doing herniotomy, transversalis fascia is incised and raised into the upper and lower flap.

FIRST SUTURE LINE

Lower flap is sutured to posterior deep part of upper flap using continuous sutures from pubic tubercle to the deep ring where it is tied at deep ring without cutting.

SECOND SUTURE LINE

Using same suture which is not cut upper flap is sutured to the shelving edge of the inguinal ligament, knot is placed over the pubic tubercle.

3rd Suture line

Suture is placed in between conjoin tendon and anterior to the shelving part of the internal ring to pubic tubercle and tied without cutting

4th Suture line

Using same suture continuously between conjoined tendon and anterior fibers of the inguinal to reach deep ring.

Lytle's Repair

Deep ring is narrowed by placing interrupted suture over the medial aspect of the ring to the transversalis fascia.

Tanner Slide

To reduce the tension in the repair area, relaxing incision is muscle over the lower rectus sheath.

Lichtenstein

Tension free, simple flap, polypropylene mesh repair for inguinal hernia. Skin is incised. Two layers of superficial fascia, outer Camper's and inner Scarpa's layer are incised.

External oblique aponeurosis is identified and incised.in the inguinal canal, cord is covered by Cremasteric muscle and internal spermatic fascia; external spermatic fascia covers the cord below the level of external ring.cremasteric muscle is opened. Medial dissection is done beyond the pubic tubercle.hernial sac is identified which is white in colour.sac is anterolateral in position with respect to cord in case of indirect sac. Sac is transfixed above the inguinal ring with 3-0 vicryl after reducing contents. redundant hernia sac is removed and Herniotomy completed. In case of direct hernia do not open the sac. Close the medial defect .15*8 cm sized prolene mesh is placed over the posterior wall, behind the cord and tail made at the deep ring where it encircles the cord structures.

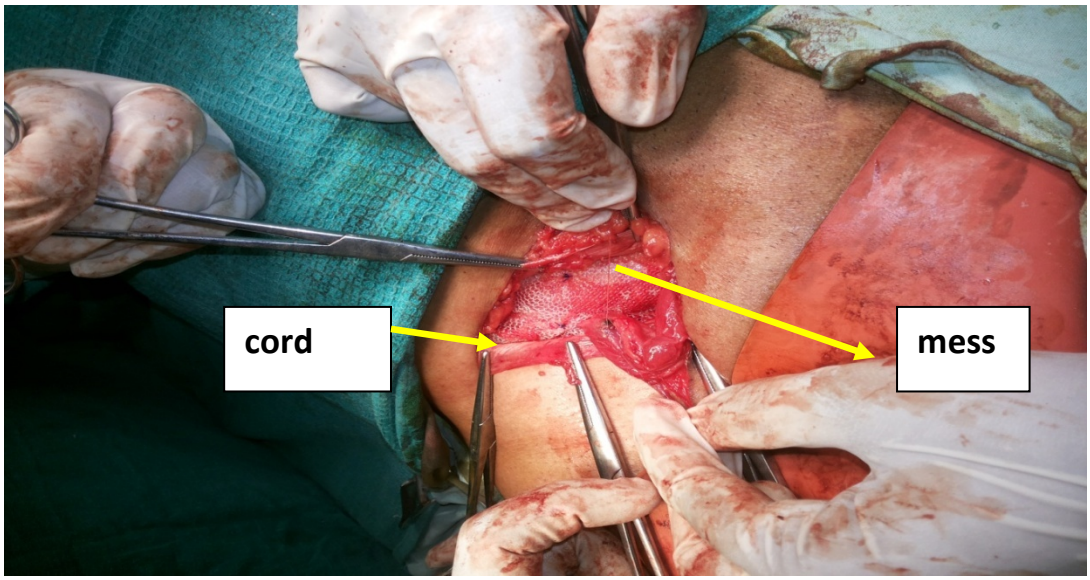


Figure:11 - LICHTENSTEIN'S REPAIR

Mesh is placed beyond the pubic tubercle (beyond 2cm), superior margin(4cm), laterally beyond the deep ring (6cm). mesh is sutured below to inguinal ligament, medially to the pubic tubercle and above to the conjoint tendon

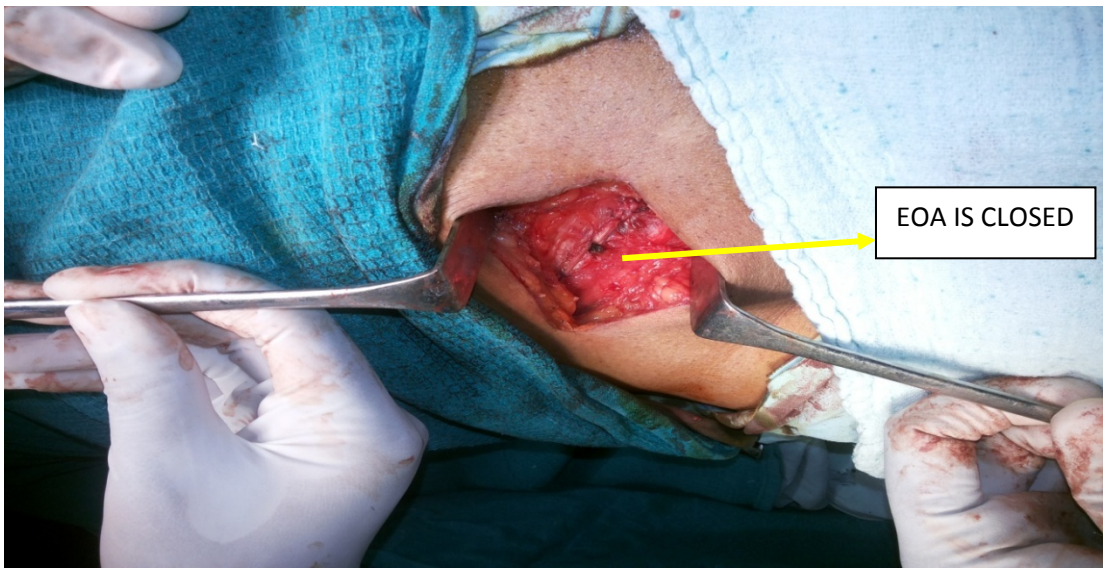


Figure:12 – EOA IS CLOSED IN LR

Wound closed in layers and sterile dressing applied.

Gilbert Mesh Repair (Patch & Plug)

Here internal ring isplugged with umbrella shaped piece of prolene mesh.

Gilbert's Prolene hernia System Repair

Open transinguinal approach to keep a mesh in both Preperitoneal (as inlay) and in front (as onlay) mesh repair.

Stoppa's (Giant prosthesis reinforcement of visceral sac)

It is performed in bilateral hernias, recurrent and hernias & hernia with collagen disease. It is performed through lower midline subumblical incision as a posterior preperitoneal space which covers the space of Bogros and space of Retzius.

Preperitoneal Mesh Repair

1) Nyhus Preperitoneal onlay mesh repair

It is performed through supra inguinal horizontal incision above the pubic symphysis and deep ring through lateral border of rectus muscle Preperitoneum is approached. Mesh is placed deep to the conjoined tendon, cord and transversalis

fascia. Mesh is sutured to the Iliopectineal ligament using 2-3 interrupted non absorbable sutures. It also sutured transverse abdominis and fascia from deep.

Modified Rives Preperitoneal Sublay Mesh Repair

Preperitoneal mesh repair through transinguinal approach (anterior approach) here mesh is place in Preperitoneal space and sutured to Iliopectineal ligament using non absorbable suture material.

Kugel's Preperitoneal Mesh Repair

It is a tension free and suturelessPreperitoneal or posterior abdominal wall groin hernia repair. It is performed through abdominal grid iron incision using fortified patch to reinforce the damaged transversalis fascia/ floor of the inguinal and femoral canal.

TAPP (trans abdominal Preperitoneal mesh repair) – Arregui – 1991

It is very much useful in large indirect hernia and irreducible inguinal hernia. 10mm umbilical port is used for laparoscope. Pneumoperitoneum is created.5mm ports on para rectal point just above the level of umbilicus one on each side. Hernia sac is dissected in the Preperitoneal plane by making incision at the upper part of the opening of the sac.

Sac is reduced and Preperitoneal space is dissected to identify the pubic bone, cooper's ligament, gonadal vessels, vas and inferior epigastric vessels. Sac

is dissected and excised. Mesh is placed in the Preperitoneal space and fixed to pubic bone/ cooper's ligament using tacks.

TEP (totally extra peritoneal repair) – Mckernon – 1990

Here we don't open the peritoneal cavity. It is useful for bilateral recurrent hernias. 2 sub umbilical horizontal incisions (10mm). Extra peritoneal space is reached. After CO2 insufflations, another 5mm port is inserted 4 cm below the first port in the midline. 3rd 5mm port is inserted in the same line 4 cm below or in the right iliac fossa. Dissection is carried out downwards then medially up to the pubic tubercle, Iliopectineal ligament lateral to iliac vessels and inferior epigastric vessels. Sac is identified, dissected and excised. Sac is transected at the internal ring by placing anend loop on the proximal part of the sac. Distal part of the cut sac is left open without ligation. Mesh is placed and spread and sutured to the Iliopectineal ligament.

Post operative complications

General Complications

1) Pulmonary atelectasis

2) Pulmonary embolism

3) Pneumonia

4) Thrombophlebitis : Most of them avoided by chest physiotherapy, Limb physiotherapy, early ambulation, good Pre operative preparation.

5) Post operative urinary retention

Can be treated by temporary catheterization

Local Complications

1. Wound infection
2. Hydrocele
3. Hemotocele
4. Dysejaculation syndrome
5. Transection of the vas
6. Nerve Injuries
7. Ischemic Orchitis
8. Testicular Atrophy
9. Inguinodynia
10. Recurrent Hernia
11. Hematoma – CAUSES:

Bleeding from superficial vessel

During resection of cremaster, careless ligature of external spermatic artery.

Injury to deep inferior epigastric vessels during division of transversalis fascia

Bleeding from venous circulation within the space of Bogros

Bleeding from Iliopubic artery

Injury to aberrant obturator artery.

Injury to femoral vein and artery.

1. Wound Infection

Wound infection depends on 4 variables

1) Number of bacterial Contaminants

2) Virulence of bacteria

3) Microenvironment of the wound

4) Integrity of the wound

Number of bacterial contaminants

Threshold of bacteria will be 1lakh bacteria per gm of tissue beyond which infection will occur.

Bacterial Virulence

1) Staphylococcus aureus is most common pathogen in surgical site. It creates thick, turbid wound abscess.

2) Staphylococcus epidermidis

3) E.Coli

4) B.Fragilis

5) Corynebacterium acne

Micro environment of the wound

1) Wound hematoma

2) Dead space leads to seroma which is Opsonin free

3) Suture material

- Braided suture material eg.Silk.
- Abundant number of knots on monofilament material

4) Mesh

Infection will be more when there is a use of fine weave such as polytetraflouroethylene.

5) Necrotic Tissue

Excessive usage of cautery creates foci of dead tissue, which increases infection.

The Host

1) Obesity increases infection, because of the avascular character of the large subcutaneous tissue.

2) Comorbidities eg. DM, Renal failure, alcoholism and malnutrition.

Prevention of wound infection

1) Preoperative shower with soap

2) Scrubbing the surgical site

3) Operative site should not be shaved the night before the procedure.

4) Hair removal immediately prior to the operation

5) Preoperative hospitalization

6) Surgical site is scrubbed with betadine, chlorhexidine (or) isopropyl alcohol. Isopropyl alcohol is discouraged if cautery is to be used.

7) Minimal number of knots in the monofilament suture material.

8) Avoid redundant and folded mesh -causes dead spacefor the sequestration of bacteria. Crinkled and bunched mesh around the perimeter of the repair increases infection.

Cefazolin 1g – Preoperative antibiotic of choice in hernia repair.

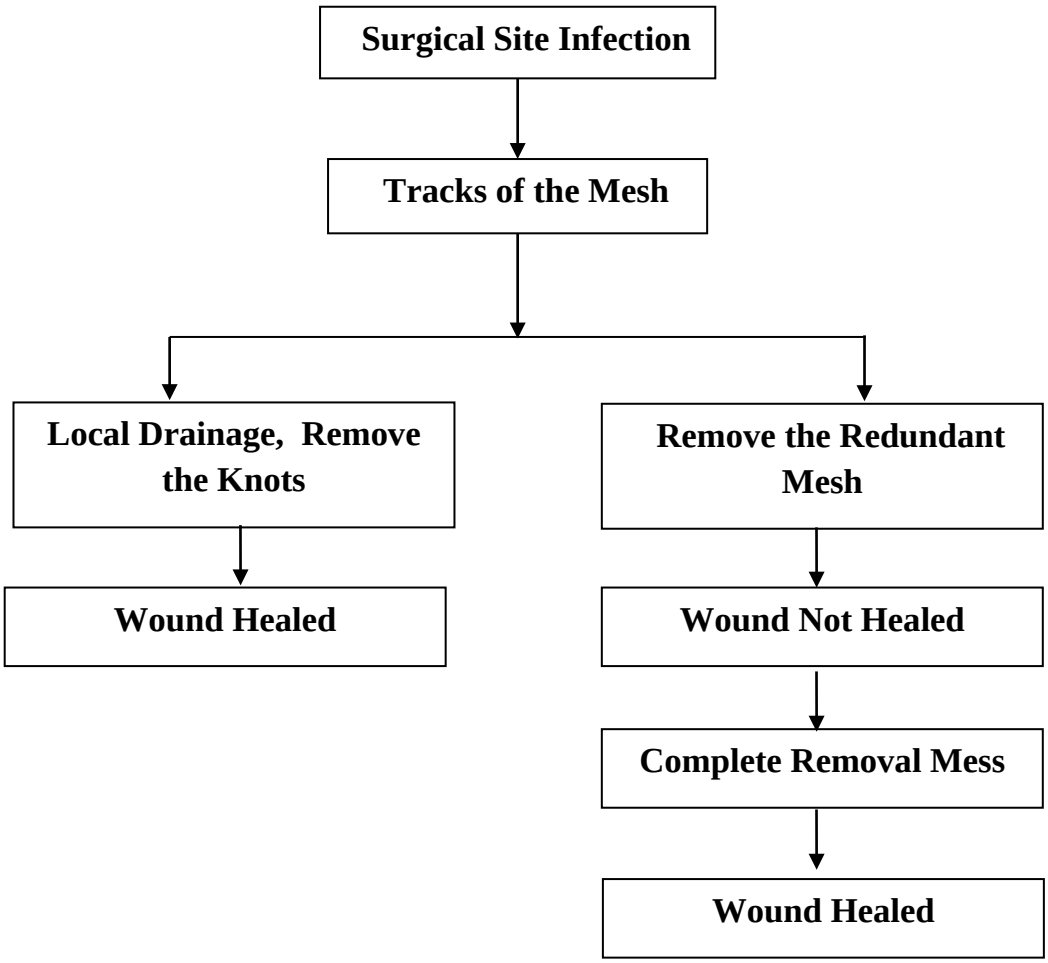


Figure : 13 – SURGICAL SITE INFECTION

2. hydrocele

It occurs if the distal sac is ligated.needle aspiration is a treatment of hydrocele .

3. hematocele

It occurs if the collection of blood in the distal sac in patients with a patent process. hematocele presents within first 12 to 24hours of early post operative period.surgical evacuation is the treatment of hematocele.

4. dysejaculation syndrome

Its occurs due to trauma to the vas during surgery, results in scarring of the lumen of the vas.

5. transection of the vas

Its occurs during hernia surgery.it is treated by end to end anastomosis over a small stent using nylon suture.

6. Ischemic orchitis and testicular atrophy

A. causes

1. vascular compromise
2. removal of adherent distal sac
3. tight reconstruction of the deep ring by mesh

B. Histology of testicular atrophy shows leydig's cell and sertoli cells appear normal and seminiferous tubules are absent.

C. investigation-doppler study

D. treatment –antibiotic

Anti inflammatory drugs

Steroid

7. inguinodynia

Causes of inguinodynia:

- Injury to ilioinguional/iliohypogastric/genitofemoral nerve.
- Direct trauma to the pubic bone.
- Hidden/incarcerated hernia either missed during the initial procedure/ early recurrence following the procedure.
- Injury/entrapment/stretching/chronic irritation of the peripheral nerves.
- Laparoscopic staple causes injury to lateral femoral cutaneous nerve of thigh, femoral nerve, obturator nerve.

- Staple placement into the periosteum of the pubic bone (osteitis pubis).

- Fibroblastic response caused by foreign body (mesh) results in eventual cicatrix, which entraps nerve in the inguinal region resulting in neuralgia.

1. **JF Maillar, P.Vantournhoudt, G.** Pirer **– Gerard, E.Mauel, Pelissier et al [8]**

   TIPP groin hernia repair using a Preperitoneal mesh performed with a permanent memory ring; a good alternative to LR (2006-2008)

   n=145- no infection of mesh, no clinical recurrence. There was an ultrasound recurrence in < 2%(n=3) of the asymptomatic patients and chronic pain in 4.8% of the patients.

   Benefits of the anterior approach (easy technique, short learning curve, low cost) and the Preperitoneal placement of the mesh (less recurrence, less pain). This procedure is a good alternative to LR.

2. **Frederik berrevoet UGent,leander Maes UGent,Koen Reyntjens UGent,Xavier Rogiers UGent,Roberto trouser UGent and Bernard de hemptinne UGent [2010][9]** ,did study to compare TIPP versus lichtensteins in relation to acute and chronic pain, post operative

complication and recuuence rate.duration of study was 18 months. They observed mean operative time for TIPP is less than Lichtenstein,33 versus 44min,respectively (p=0.04).less post –operative pain observed in the TIPP than Lichtenstein group.recurrence were observed less in TIPP than LICHTENSTEIN group respectively 2.8% versus 5.1%.

3. **pelissier and colleagues(2007)[5]** described that recurrence rate is 2% and rate of chroin pain is 5-7% in TIPP groups

4. more recently **berrevoet and his team[6]** described a recurrence rate of 1-3% and visual analogue pain scale of 0.2 1yr after TIPP.reason for lower rate of post operative pain 1.minimal dissection around the ilioinguinal and iliohypogastric nerve.2.no fibrosis of the mesh in contact with the inguinal nerve.

5. **koning GG ,Schipper HJP, Oostvogel HJM, Verhofstad MHJ,Gerritsen PG,Larrhoven KCJHM,Vriens PWHI[12]**double blind RCT comparing Lichtensteins and TIPP (2009-10). Studied in 496 patients:225 TIPP and 271 LICHTENSTEINS. This study revealed no significantly better result for the TIPP as compared to lichtensteins.

6. **Moldoon RL,Marchant k, J OHNSON dd,yoder GG,Read RC, Hauer-Jensen M, RCT study of lichtenstien and TIPP Trial (2004)[10],**described recurrence in the lichentenstein is 4.3% and in less

than 1% recurrence in THE PRE PERITONEAL Read Rives. Both anterior repairs are associate with low post operative morbidity and recurrence rates.(p=0.21)

7. **Giel G.Koning : Patrick W.H.E Vriens 2011 , St Elizabeth hospital, The Netherlands[11]**

Anterior PPR of extremely large hernias. In extremely large hernias, the lateral side of the mesh can be insufficient to fully embrace the hernia sac. They describe the use of 2 preperitoneal placed meshes (Butterfly technique) to repair extremely large hernias. 2 inverted meshes to cover the deep ring both medial and lateral.

Follow up was done at 6 months.

n=689pts (2006-2008)

mean age – 69.9 years (63-73)

all U/L extremely large hernias 1% - n=7

recurrence did not occur after repair. Chronic pain was not reported.

TEP – no contact with nerves in the inguinal canal.

8. **G.G.Koning , J.P de Schipper, H.J.M. Oostrigel, M.H.J. Verhofstad, G.P.Gerristen, C.J.H.M. Van Larrhova et al (2010)[14]**

n= 496, TIPP=225, LR=271

	TIPP	**LR**
MEAN AGE	52.7	57.3
ASA CLASSIFICATION I	54%	51%
ASA CLASSIFICATION II	36%	38%
ASA CLASSIFICATION III	5.3	11%
GENDER M/F	257/15	210/14
COMPLICATIONS	7.6%	
RECURRENCE	n=1	n=3
BLEEDING AND REOPERATION	n=4, 1 patient	n=4, 3 patients
CHRONIC PAIN	10 patients (4.4%)	10 patients (4%)
PERSISTING SENSORY LOSS	0.9%, 2 patients	2.2% (6 patients)

Table:1

9. **Muldoon RL, Marchant K, Johnson DD, Yoder GG, Read RL, Haver-[10]**

Jensi M PPR (n=121); LR(n=126)

Read Rive's 9min longer than LR.

No wound infection.

	PPMR	**LR**
RECURRENCE	1 (<1%) P=0.21	5 (4.3%)

Table:2

10. **Jamal Akhavan Moghaddan, Shaban Mehrvarz, Hassan ali Mohabbi[13]**

Comparison of Read Rive's and LR for treatment of unilateral inguinal hernia.

RCT=126 patients. Read Rive's – 64 ; LR- 62

Evaluated for early postoperative complications, duration of surgery and hospital Stay, return to normal activity, recurrence. Equal in both the groups.

12. G.G.Koning, C.S.Andeweg, F.Keus, M.W.A. Van Tilburg, C.J.H.M. Van Larrhova, W.L. Akkers dijk.

Laparoscopic hernia repair popularized the Preperitoneal mesh position due to promising result of less chronic pain. However, considering the proportions of severe adverse events, learning curve, added cost, Performed trans rectus sheath preperitoneal repair in 50 patients.

They observed no technical problems in surgery, no recurrence and chronic pain after a mean follow up of 2 years.

AIM OF THE STUDY

The prime cause of post operative pain in hernial surgeries is nerve entrapment by mesh, osteitis pubis, injury to a neural structure, injury to vas, injury to testis. many surgical techniques are there to treat inguinal hernia. post operative pain has been reported in 15-35% after lichtenstein's repair.

Classical anterior transinguinal Preperitoneal inguinal hernia prosthetic repair is a safe and simple procedure. Pre peritoneal placement of mesh protects against infections from the superficial planes of the wound, abdominal pressures helps the mesh to adhere to musculo-aponeuotic region in order to provide a strong barrier against recurrence, inguinal, femoral and obturator hernia.

The objectives of this study are:

1. Prospective study of 25 cases of transinguinal Preperitoneal mesh repair done between 2014 and 2015 in our institution.

2. To assess the post operative pain in these patients by visual analogue pain score and compare with those experienced in patients who underwent lichtensteins repair.

3. To compare the duration of procedure between transinguinal Preperitoneal repair and lichtensteins repair procedures.

4. To study the incidence of complications [like scrotal collection,seroma,cord oedema, wound infection,injury to vessels and injury to nerves] that occurred after pre peritoneal mesh repair.

5. To look for any recurrence during the follow up period in the transinguinal Preperitoneal mesh repair.

MATERIALS AND METHODS

About 25 cases of transinguinal pre peritoneal mesh repair was done in the period 2014 to 2015 at Kilpauk medical college hospital.cases were selected at random irrespective of the type of inguinal hernia, the age of the patient and the size of the defect.the material used for repair is monofilament polypropylene clear non absorbable synthetic knitted surgical mesh available in our hospital as SURUMESH manufactured by SURU INTERNATIONAL PVT .LTD.

These cases were followed up in the immediate and post operative periods.post operative pain,scrotal collection,seroma, cord oedema and wound infection were looked for.they were asked to come for regular follow-up visit after discharge.during each follow-up visit,the patients were assessed for pain,surgical site infection and recurrence.

POLYPROLENE MESH:

- Monofilament mesh does not have any antibacterial properties.
- .Its hydrophobic nature and monofilament microstructure impede bacterial ingrowth.
- Provokes a fibrous reaction leading to collagen contraction and stiffening.

- Mesh shrinkage is due to natural contraction of fibrous tissue embedded in the mesh reducing the area of mesh which leads to tissue reaction, pain and also hernia recurrence.

- Mesh shrinkage by upto 50%.

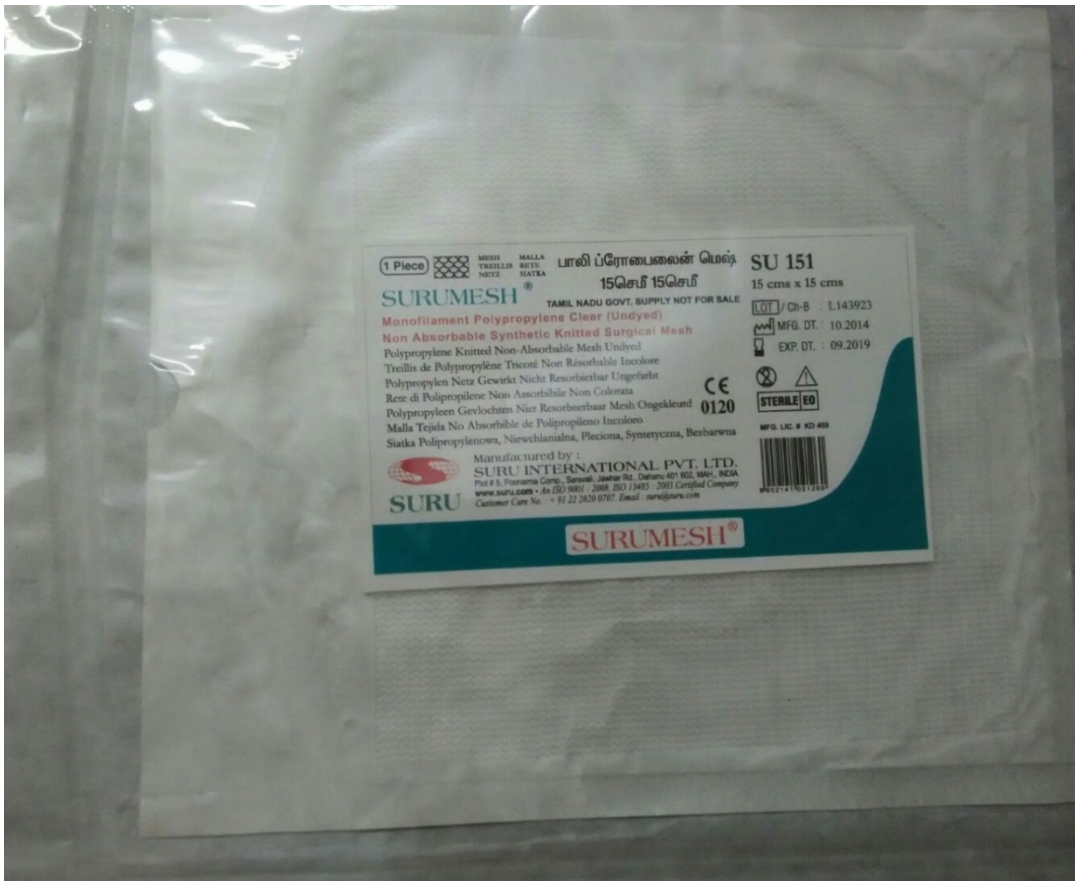


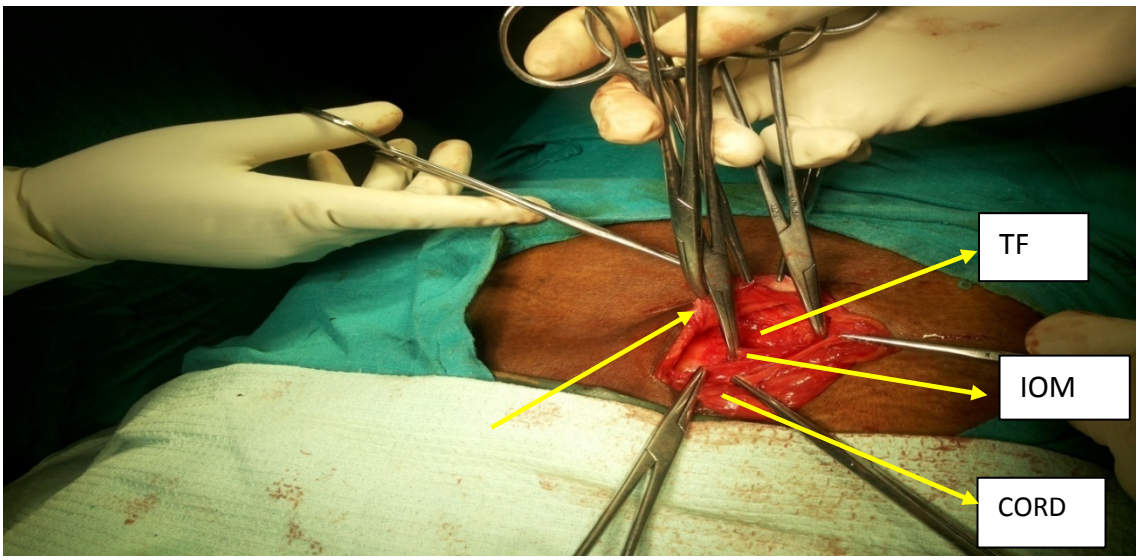
Figure:14 – PROLENE MESH

Meshes with thinner strands and larger spaces between them are lightweight (<40g/sq.m)

- Large pore meshes are ideal as they have better tissue integration, less shrinkage, more flexibility and improved comfort.

Transinguinal pre peritoneal mesh repair[4]

Under spinal anesthesia, asepticprecaution, parts painted and drapped,classical inguinal incision made between the anterior superior iliac spine and the pubic tubercle. Then external oblique fascia is divided, cord structure and sac identified,ilio inguinal nerve is isolated from the posterior inguinal wall. In a case of indirect hernia, sac is separated from the cord well beyond the deep ring, content reducedand then sac is transfixed and excised. In case of congenital hernia, firm adhesion with the tunica vaginalis,sac may be transected in the middle part, leaving open the distal sac.In case of direct hernia,is reduced into the peritoneal cavity,transvesalis fascia is opened from the deep ring to the pubic tubercle, safe-guarding the epigastric vessels.



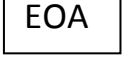


Figure:15- EOA-external oblique aponeurosis.
IOA-internal oblique muscle.

Pre peritoneal space is defined,dissection is extended laterally beyond the deep ring,inferiorly to the cooper's ligament and medially to the outer border of the rectus sheath.

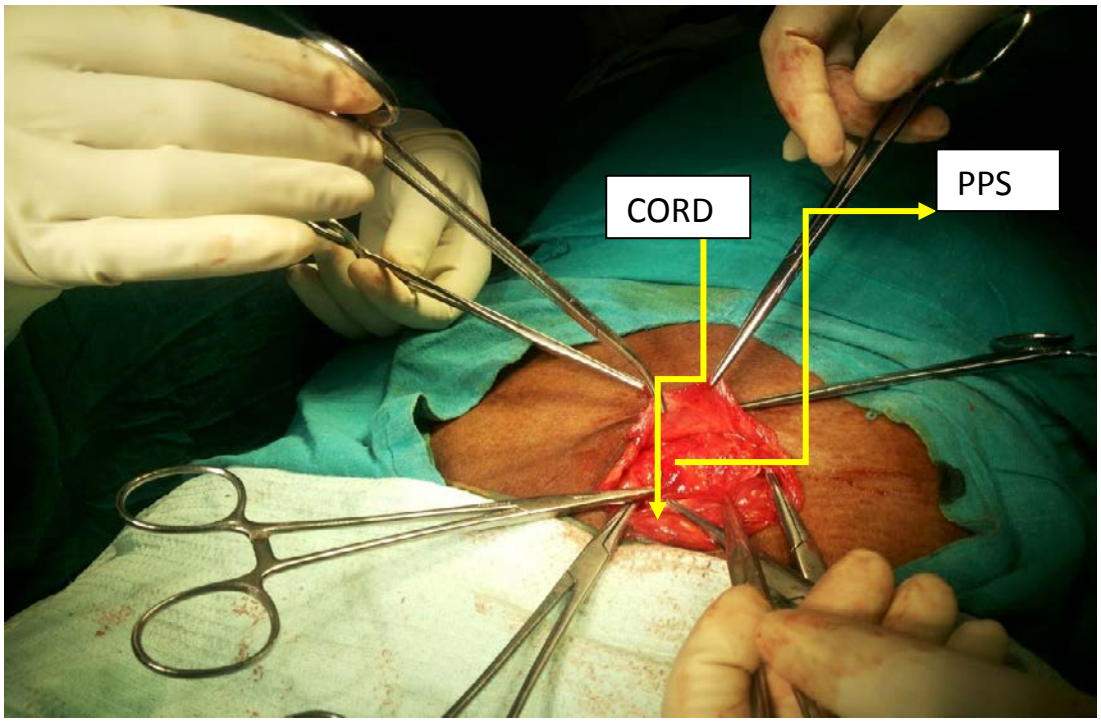


Figure:16- PPS-pre peritoneal space

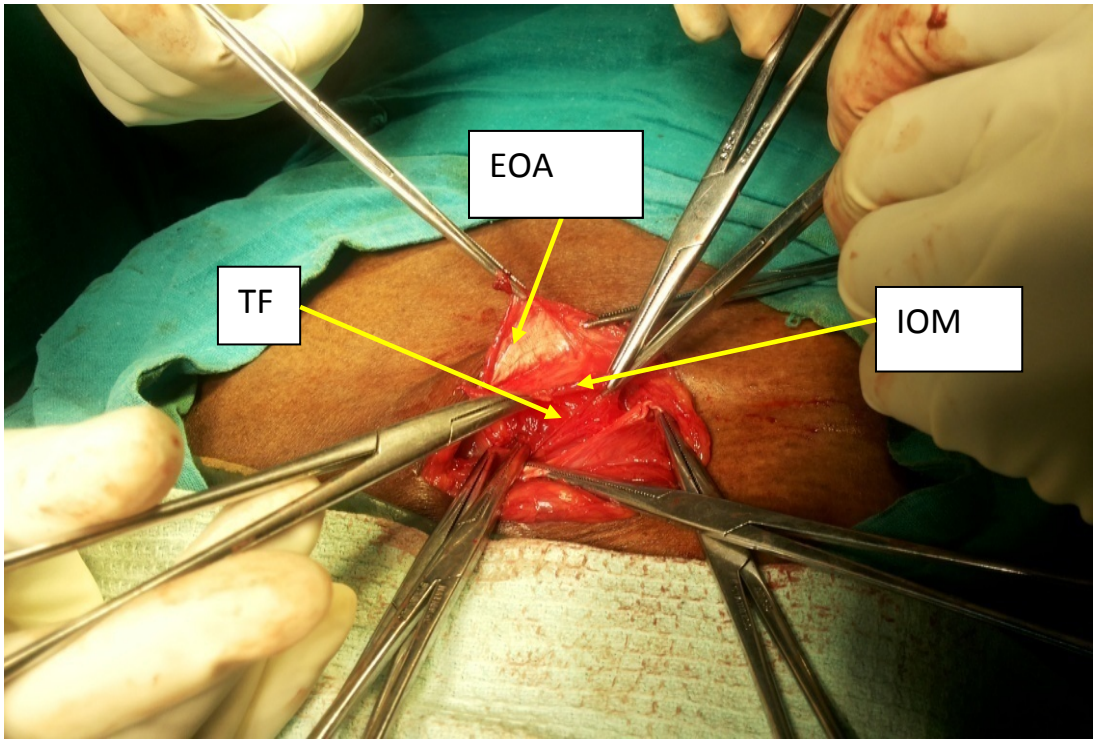


Figure:17 - TIPP

A synthetic poly propylene mesh,rectangular in shape, 15x7cm in size,is prepared to cover Bogros's space and the Fruchaud's Myopectineal orifice.

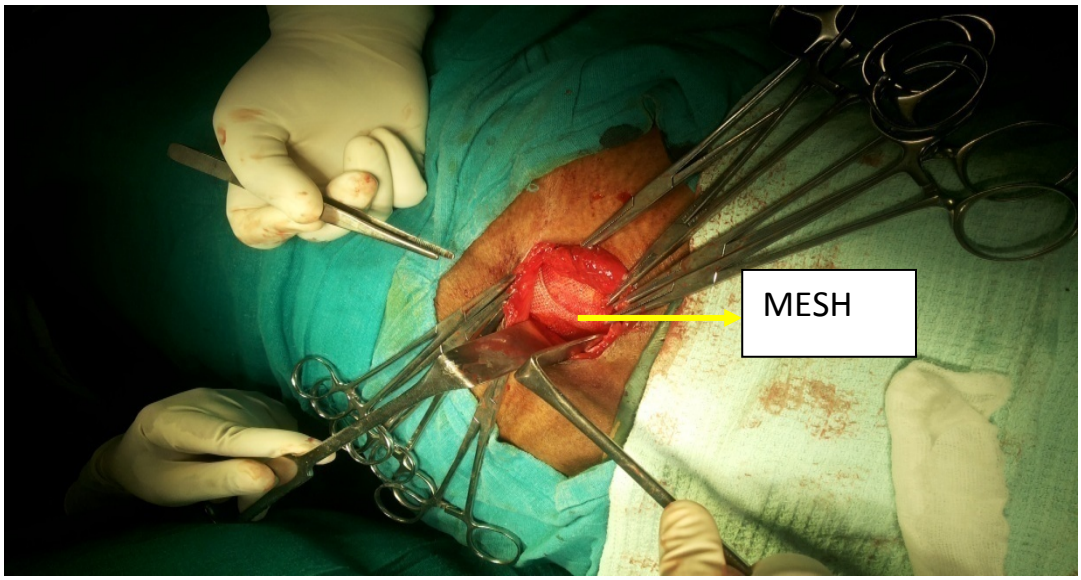


Figure:18 - MESH IN THE PRE PERITONEAL SPACE

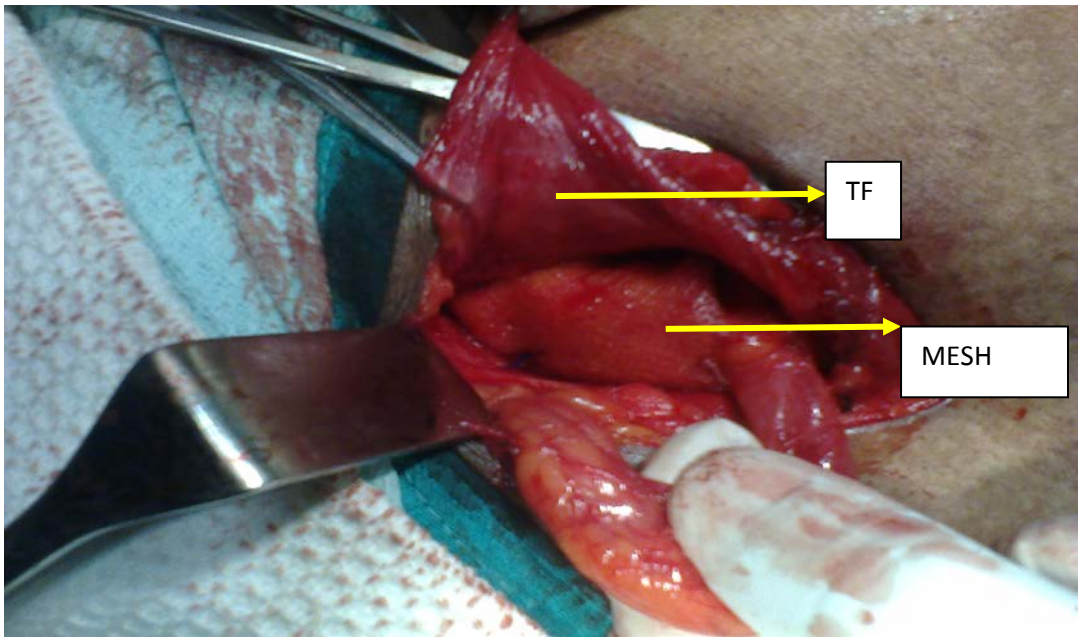


Figure:19 - TF-TRANSVERSALIS FASCIA

A slit is made at the lateral end of the mesh, to create anew deep ring and allow free passage of the cord.the mesh is anchored inferiorly to the ilio Pectineal ligamentmedially to the rectus sheath.the two tails of the newly created deep ring are crossed behind the cord and laterally sutured to the internal obligue muscle. Figure:15

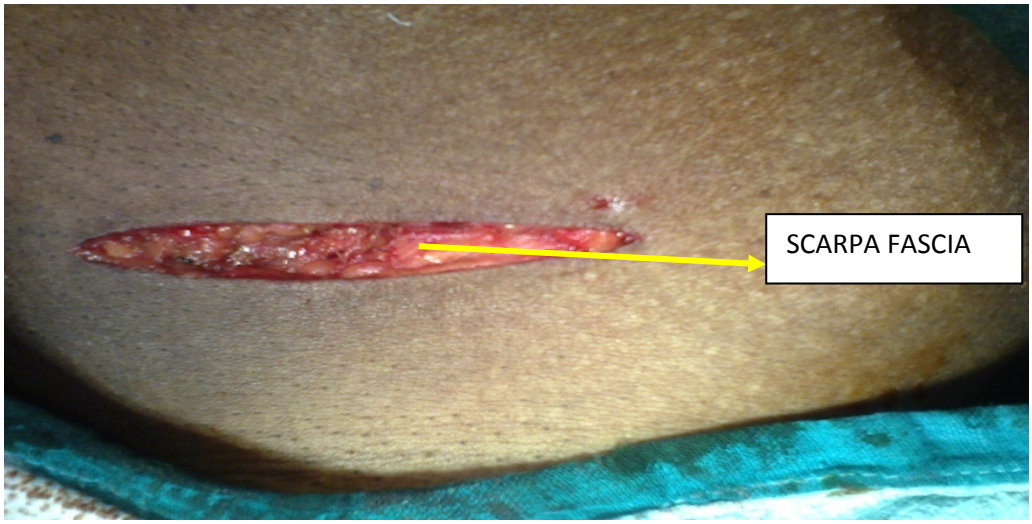


Figure : - 20 FASCIA CLOSED IN TIPP

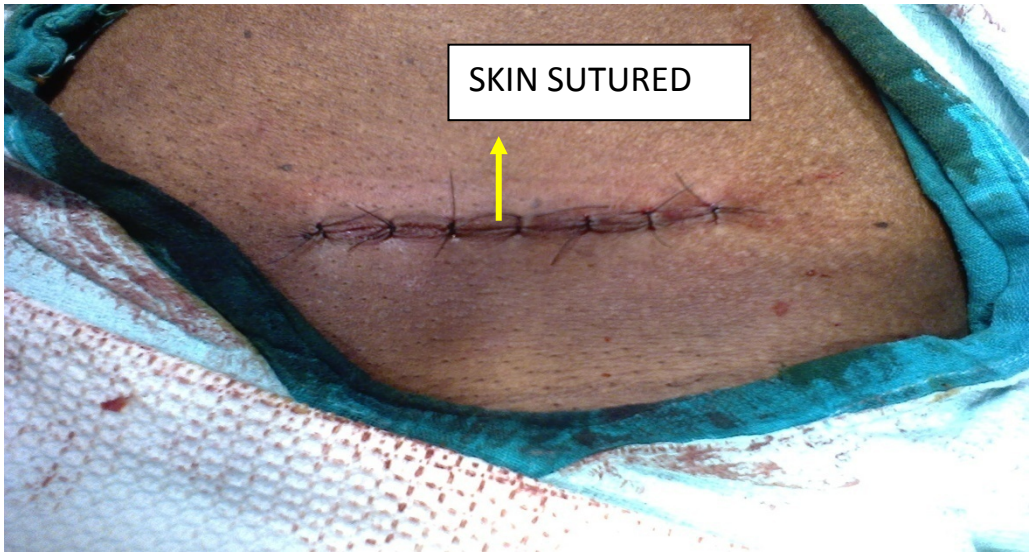


Figure:21 - SKIN CLOSED IN TIPP

External obligue fascia is sutured.skin is closed.compressive dressing to be done at the end of the procedure. post operatively analgesic and antibiotics given. each patients discharged at 7th post operative days.

OBSERVATION AND RESULTS

Types of outcome measures:

Primary outcomes:

Preoperative period:

- Injury to peritoneum
- Injury to vessels
- Mean duration of operation

Early postoperative period:

- Hemorrhage
- Wound infection
- Scrotal collection
- Cord edema

- Acute pain, measured with the VAS pain score, was defined as any score above 0
- Duration of hospital stay
- Return to sedentary work

At 1 month:

- Wound infection
- Scrotal collection
- Hernia recurrence
- Chronic postoperative pain (inguinodynia) measured using the VAS pain score.The cut off value for pain on the 100-mm VAS pain score was 0.

At 3rd month:

- Wound infection
- Scrotal collection
- Hernia recurrence
- Chronic postoperative pain (inguinodynia) measured using the VAS pain score at three months during follow-up. The cut off value for pain on the 100-mm VAS pain score was 0.

QUESTIONNAIRE

Name:

Age:

Sex:

Type of hernia:

Co morbidities present: hypertension/ diabetes/ COPD/ prostatism/ constipation

Mean duration of operation:

Duration of hospital stay:

Return to sedentary work:

	Preoperative period:	Yes	No
	• Injury to peritoneum		
	• Injury to vessels		
	Early postoperative period:		
	• Hemorrhage		
	• Wound infection		
	• Scrotal collection		
	• Cord edema		
	• Acute pain, measured with the VAS pain score, was defined as any score above 0		

	At 1 month:		
	• Wound infection		
	• Scrotal collection		
	• Hernia recurrence		
	• Chronic postoperative pain (inguinodynia) measured using the VAS pain score.The cut off value for pain on the 100-mm VAS pain score was 0.		
	At 3rd month:		
	• Wound infection		
	• Scrotal collection		
	• Hernia recurrence		
	• Chronic postoperative pain (inguinodynia) measured using the VAS pain score at three months during follow-up. The cut off value for pain on the 100-mm VAS pain score was 0.		

Table:3

RESULTS

Among the 50 patients taken for the study, 25 patients were subjected to lichenstein's hernia repair and 25 for the TIPP procedure. The mean age of the patients subjected to lichenstein repair was 53.84years and for TIPP it was 48.76yrs.

The baseline characteristics of both the group is shown in the table 4

	TIPP	**Lichenstein**
Total no. of patients	25	25
Sex		
Male	24	24
Female	1	1
Age		
20-40yrs	5	3
42-60yrs	13	15
>60yrs	7	7
Type of hernia		
Indirect	14	12
Direct	11	13
Duration of surgery	45mins-1hr	35-45mins

Table 4: Baseline Characteristics

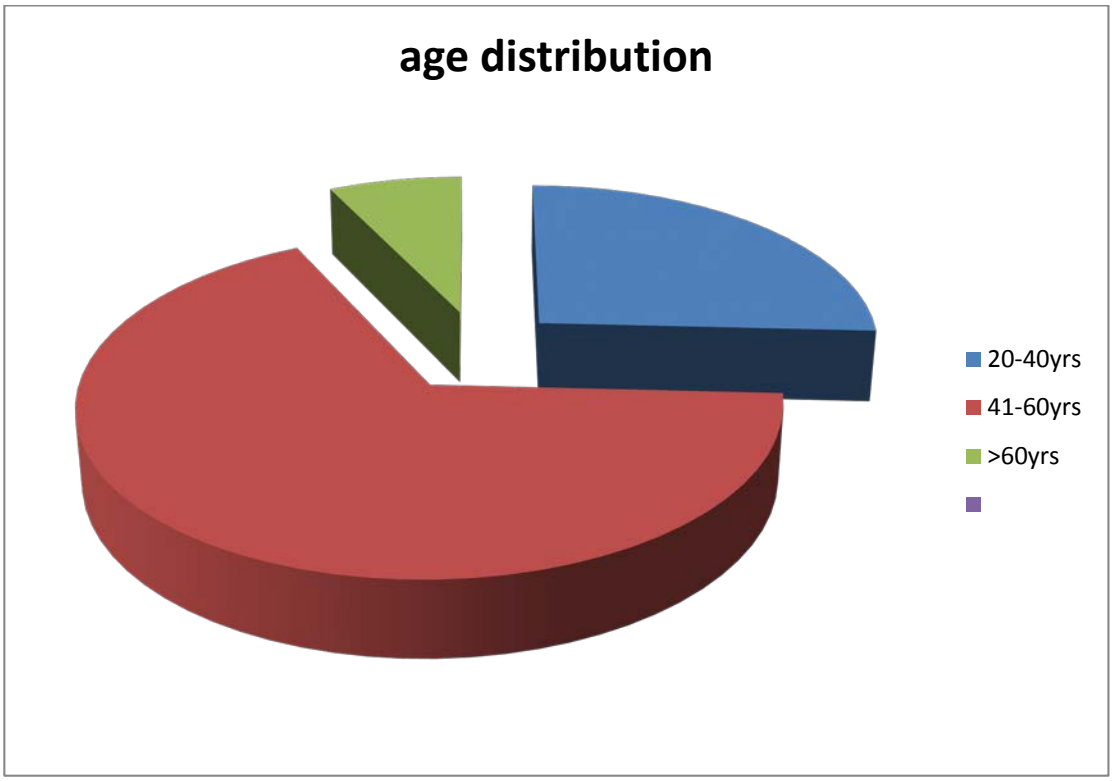


Figure : 22 - AGE DISTRIBUTION OF PATIENTS SUBJECTED TO TIPP

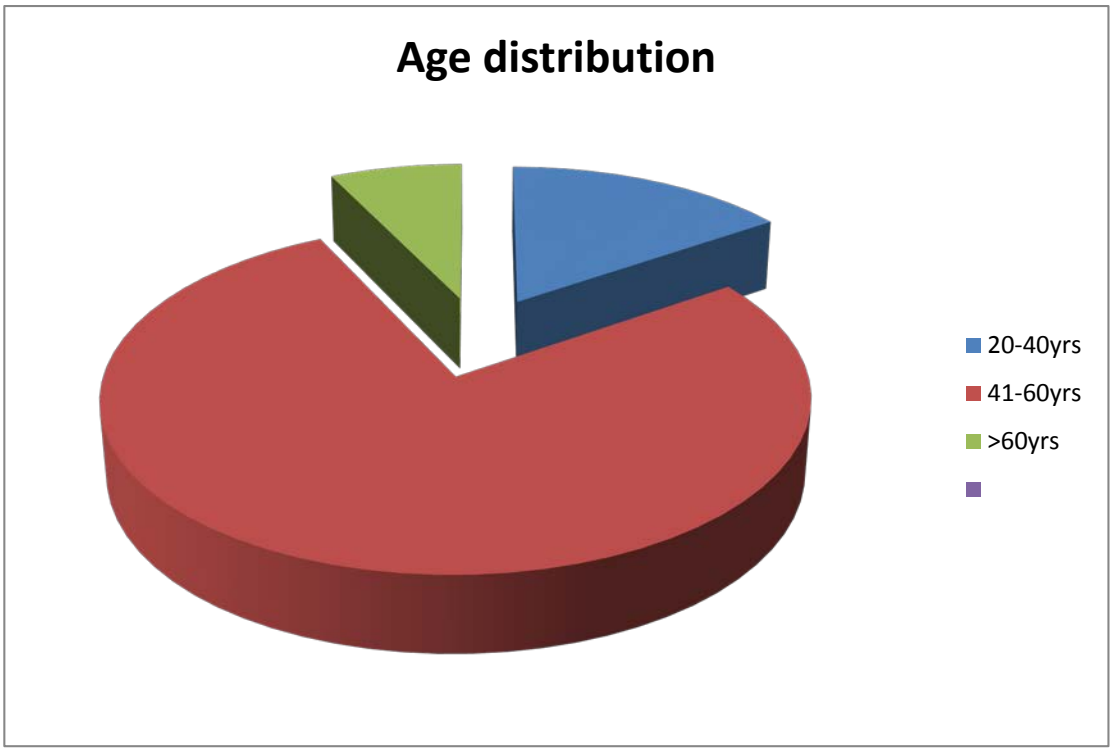


Figure : 23 - AGE DISTRIBUTION OF PATIENTS SUBJECTED TO LR

The duration of operation was more in the TIIP group and this was statistically significant. ($p < .05$)

The per operative complications encountered were injury to peritoneum, vessels and nerve as shown in figure:24.

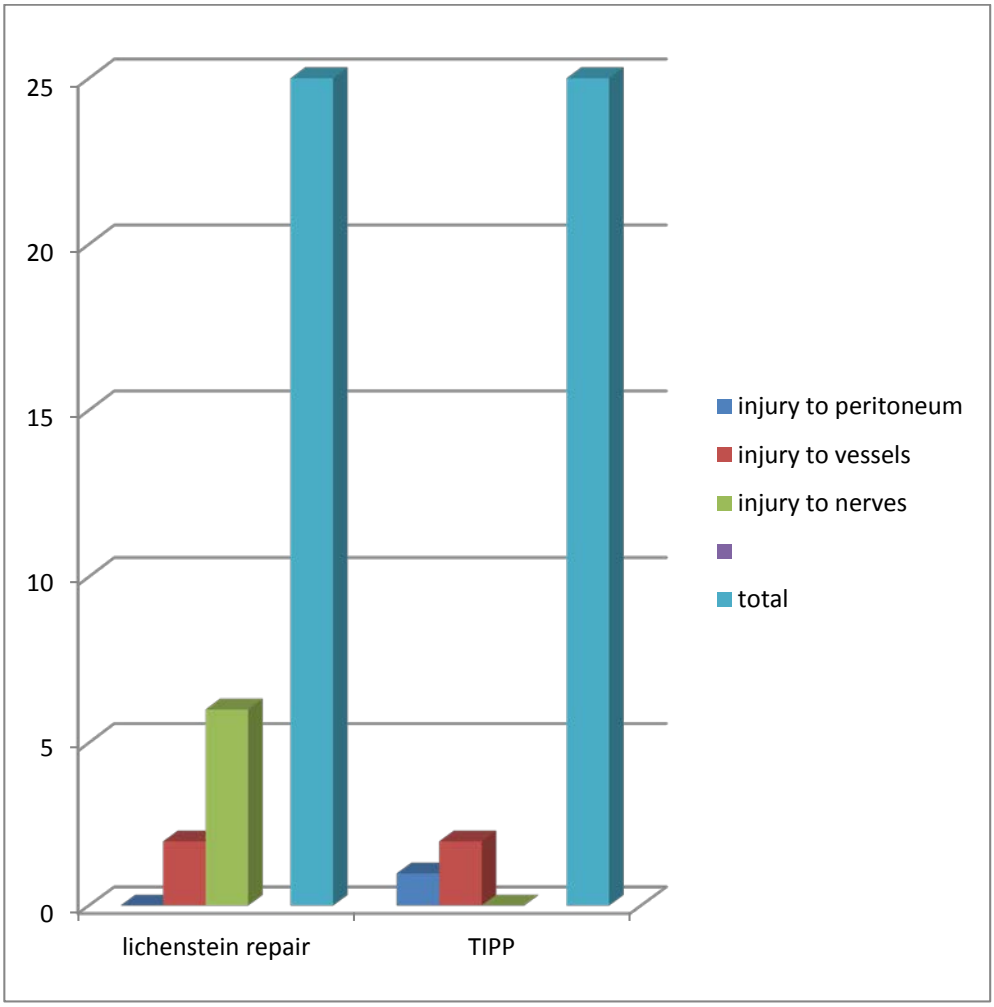


Figure : 24 - PER OPERATIVE COMPLICATIONS

The various early post operative complications encountered among the patients subjected to Lichenstein repair were seroma, surgical site infection, scrotal collection, cord edema and pain as shown in figure:25

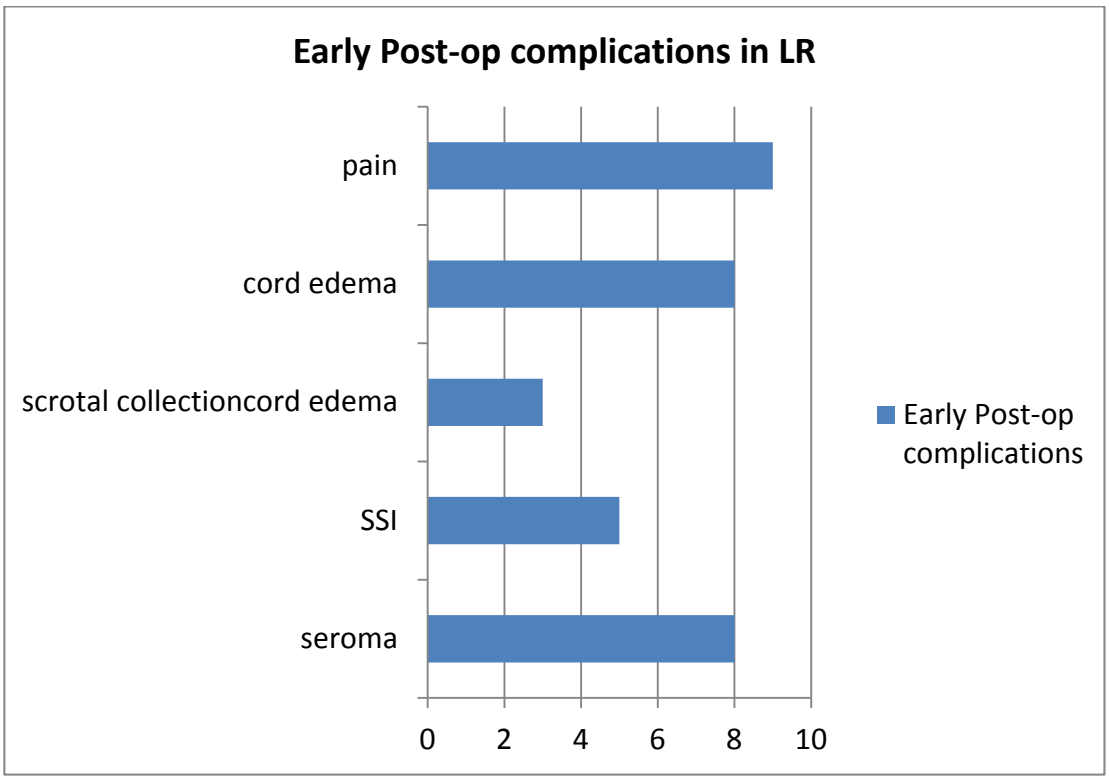


Figure : 25- EARLY POST-OP COMPLICATIONS IN LR

Among the patients who underwent TIPP procedure the early post operative complications seen were pain and surgical site infection with only 8% of the patients experiencing it.(table 4)Table 4 early post operative complications in TIPP

Complications	Number
Seroma	0
Surgical site infection	1
Scrotal collection	0
Cord edema	0
Pain	1

Table 5

EARLY POST OPERATIVE COMPLICATE IN TIPP

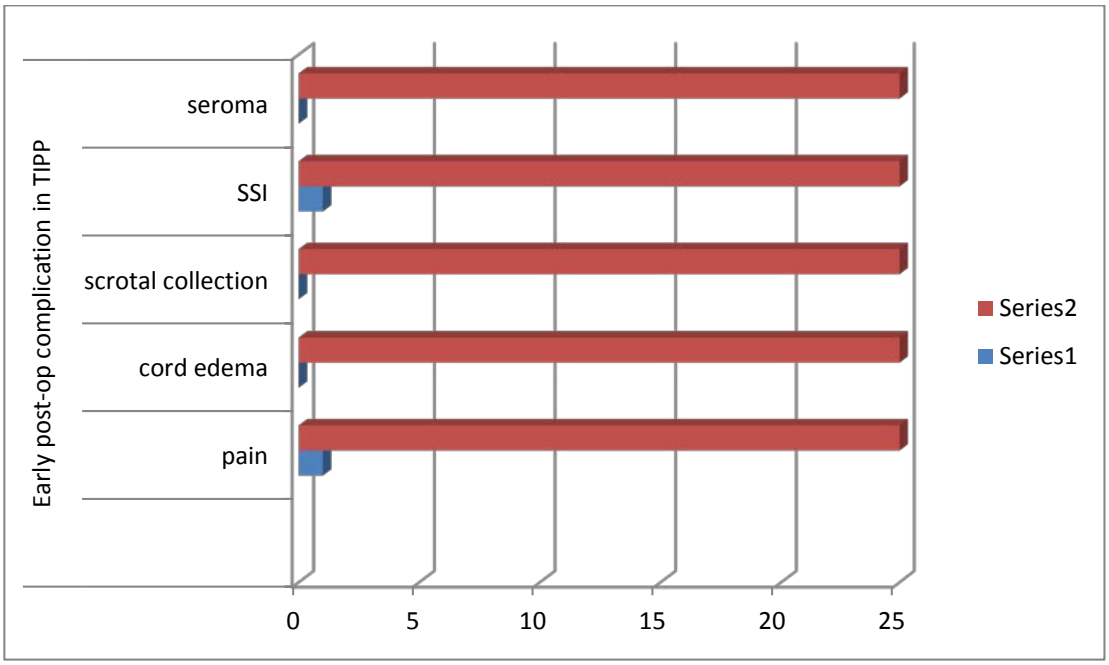


Figure : 26 – EARLY OPERATIVE COMPLICATE IN TIPP

During the first follow up of patients at one month it was noticed that 24% of patients who underwent linchenstein repair had complications of SSI, cord edema, recurrence and pain. On the other hand only one patients who underwent TIPP had pain complications.

Complications	**Lichenstein**	**TIPP**
At 1 month		
Surgical site infection	2	0
Recurrence	0	0
Cord edema	2	0
Pain	2	1
Loss of sensation	5	0

Table:6

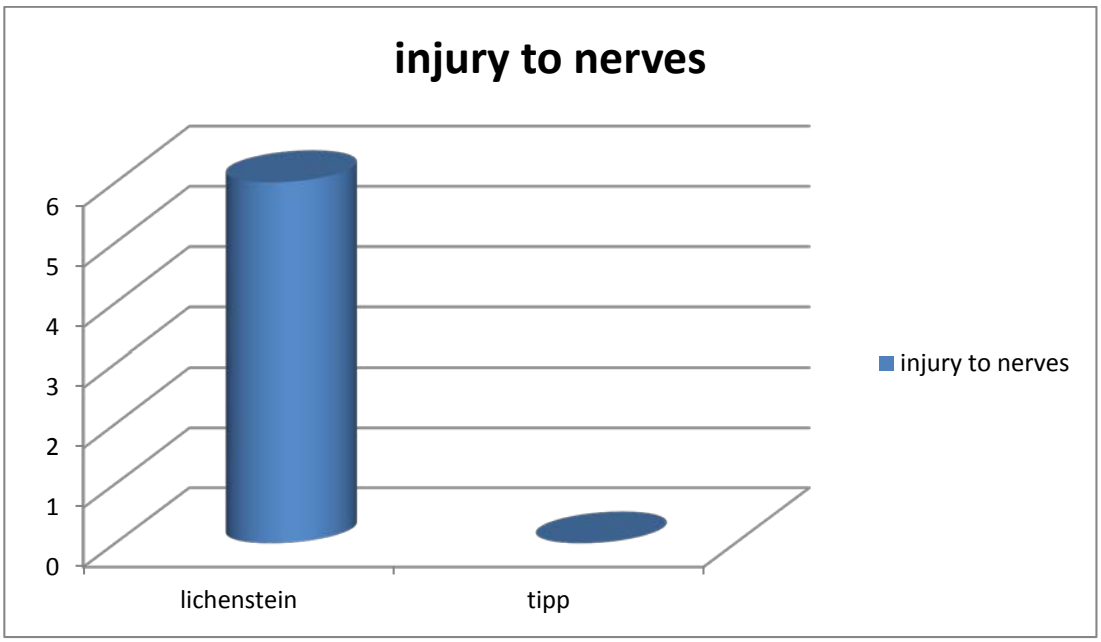


Figure :27 - COMPARISON BETWEEN LICHESTEIN AND TIPP

At second follow up it was noticed that not one patient who underwent TIPP had complication like chronic pain,cord oedema,sensory loss and recurrence in my observation.on the other hand one patient who underwent LR had chronic pain and 2 patient who underwent LR had sensory loss

Complication at 3rd month	LR	TIPP
CHRONIC PAIN	1	0
CORD ODEMA	0	0
RECURRENCE	0	0
SENSORY LOSS	3	0

Table :7

Post operative complication at 3rd month.

Total patients-25 in LR,25 in TIPP

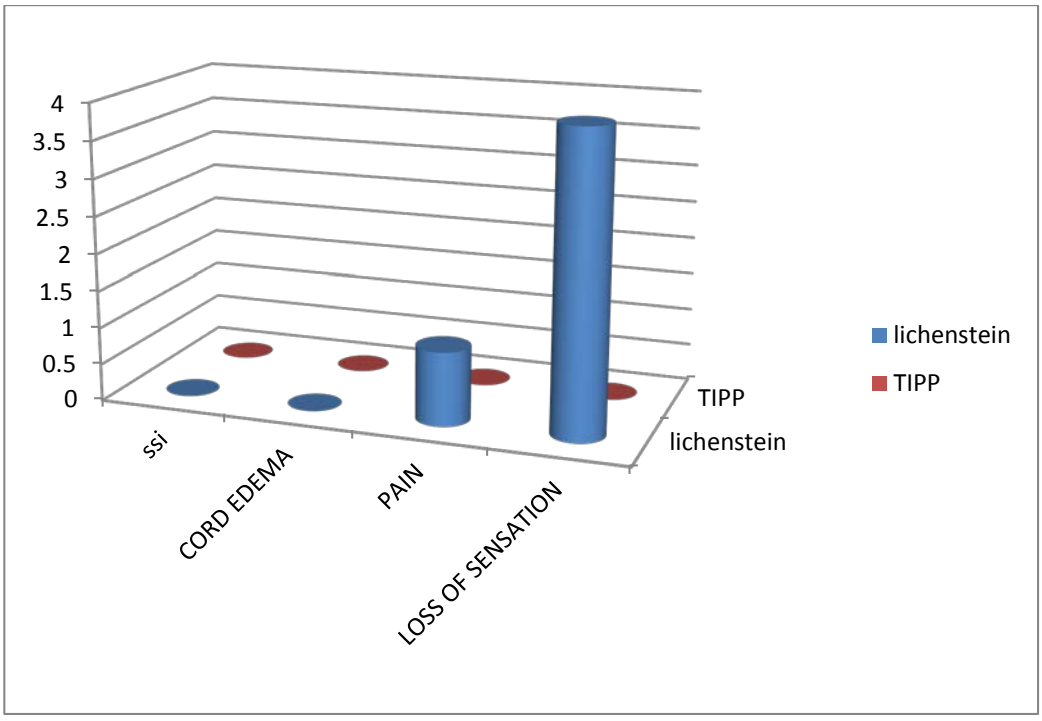


Figure :28 - POST OPERATIVE COMPLICATION AT 3RD MONTH.

	Median pain score (using visual analog score)			
	On day 1	**Day 7**	**At 1 month**	**At 3rd month**
Lichenstein repair	6	3	1	0
TIPP	4	0	0	0

Table:8

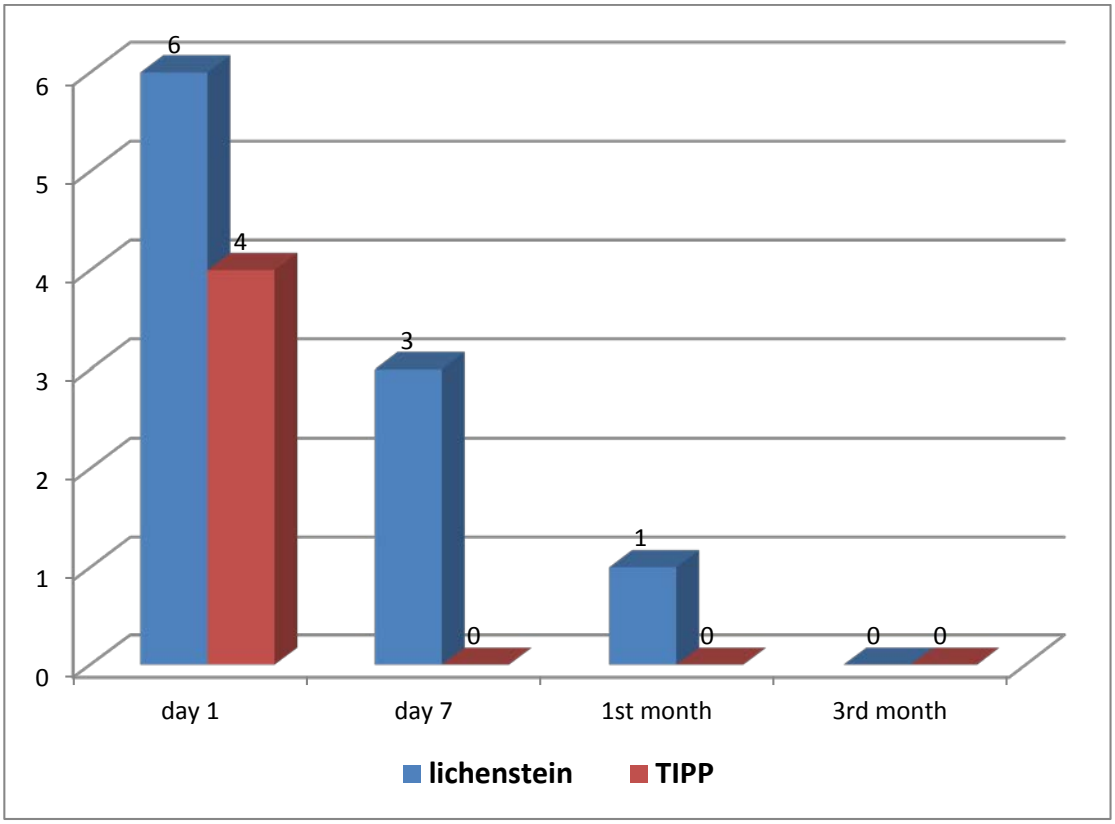


Figure: 29 – MEDIAN PAIN SCORE

Occurrence of pain at 3 rd month between the lichenstein and TIPP repair is not statiscally significant($p>0.05$)

SUMMARY

Of the 25 transinguinal pre peritoneal mesh repair was done 12 were indirect hernia versus 13 were direct hernia.most of them were European hernia society classification PM1.maximum number of patients belonged to 45-55year age group.

From the observation,it is clear that post operative pain is very much less with transinguinal pre peritoneal mesh repair using prolene mesh with most of the patients having minimal or no pain after 2 days.The majority of patients required only oral analgesic.Most of them required sedation only on the day of their surgery.One patient developed wound infection at the end of 1st week, no patient developed wound infection,cord oedema,recurrence at the end of 1st month and one patient who developed chronic pain at the end of 1month in this group of patients. unrestricted activity was encouraged in these patients after discharge.

Out of 25 patients for transinguinal pre peritoneal mesh repair. 23 patients came for regular follow-up.the average follow up period was 3 month.during each follow-up visit, patients were assessed for pain, any restriction of physical activity,surgical site infection,mesh rejection and recurrences . 25patients underwent lichtensteins repair experienced more pain in the early post operative period.the intensity of pain was more in the early post operative period, the intensity of pain was even more increased during coughing and during

ambulation. Although these patients experienced minimal pain at rest after 5 days the intensity was increased during coughing and ambulation. These patients needed larger doses of analgesics and sedatives and most of them had restricted physical activities up to 1 month post operatively.5 patients developed wound infection.8 patients developed cord oedema,at the end of 1st week 9 patients developed pain over surgical site.althouth no recurrence was noted in these group, 1 patient developed pain at 3rd month.

DISCUSSION AND CONCLUSION

In our experience, the repair of groin hernias with Preperitoneal mesh(Prolene mesh through an inguinal incision) has resulted in greater patient comfort with reduced post operative pain and also decreased number of complications. Although there was no recurrence observed in my study,the follow up period was only minimal (average 3 month). The duration of stay in the hospital was reduced and the patients had a rapid return to work.

Hence the transinguinal pre peritoneal mesh repair is an amazing simplistic technique which gives an approach to inguinal, femoral and obturator hernias and bears the same anatomical relationship in TEP and TAPP approaches which gives a better understanding of the TEP and TAPP procedures.It is an easy technique with short learning curve.The risk of vessel injury is less in the hands of an expert. The contact of mesh with the cord structures and nerve is minimal which reduces the postoperative cord oedema, pain (Inguinodynia), orchitis and sensory loss.

STUDY PROFORMA

Name of the patient: age: sex:

Ip no: occupation:

Date of admission: date of surgery: date of discharge:

Complaints on admission

Duration of symptom:

Any predisposing factors:COPD/heavy physical activity/weak abdominal wall/BPH/ urethral stricture/neurological weakness/constipation/family h\o connective tissue disorder/any others

Any comorbidity : hypertension/DM/asthma/CAD/CVA/epilepsy

Clinical examination: direct/indirect hernia/complete/ incomplete

Any complication: reducible/irreducible/obstruction/strangulation

Nature of surgery:

Type of anaesthesia:

Per operative period:

Injury to peritoneum

Injury to vessels

Injury to nervePost operative pain score:

At 24hrs 1week 1month 3rdmonth

Post operative complications if any:

Follow up visits at 1st month:

At 3rd month: any complication like pain, infection,restricted physical activity,meshrejection,cordoedema,scrotalcollection,recurrence.

நோயாளி ஒப்புதல் படிவம்

ஆராய்ச்சியின் விவரம் :

ஆராய்ச்சி மையம் : அரசு கீழ்பாக்கம் மருத்துவக் கல்லூரி மருத்துவமனை

நோயாளியின் பெயர் : நோயாளியின் வயது:

பதிவு எண் :

நோயாளி கீழ்கண்டவற்றுள் கட்டங்களை (✓) செய்யவும்

1 மேற்குறிப்பிட்டுள்ள ஆராய்ச்சியின் நோக்கத்தையும் பயனையும் முழுவதுமாக புரிந்து கொண்டேன். மேலும் எனது அனைத்து சந்தேங்களையும் கேட்டு அதற்கான விளக்கங்களையும் தெளிவுபடுத்திக் கொண்டேன். ☐

2 மேலும் இந்த ஆராய்ச்சிக்கு எனது சொந்த விருப்பத்தின் பேரில் பங்கேற்கிநேன் என்றும், மேலும் எந்த நேரத்திலும் எவ்வித முன்றிவிப்பு மின்றி இந்த ஆராய்ச்சியிலிருந்து விலக முழுமையான உரிமை உள்ளதையும் இதற்கு எவ்வித சட்ட பிணைப்பும் இல்லை என்பதையும் அறிவேன். ☐

3 ஆராய்சியாளரோ, ஆராய்ச்சி உதவியாளரோ, ஆராய்ச்சி உபயத்தாரரோ, ஆராய்ச்சி பேராசிரியரோ, ஒழுங்குநெறி செயற்குழு உறுப்பினர்களோ எப்போது வேண்டுமானாலும் எனது அனுமதியின்றி எனது உள்நோயாளி மற்றும் புற நோயாளி பதிவுகளை இந்த ஆராய்ச்சிக்காகவோ அல்லது எதிர்கால பிறஆராய்ச்சிகளுக்காகவோ பயன்படுத்திக் கொள்ளலாம் என்றும் மேலும் இந்த நிபந்தனை நான் இவ்வராய்ச்சிலிருந்து தகும் என்றும் ஒப்புக்கொள்கிறேன். ஆயினும் எனது அடையாளம் சம்பந்தப்பட்ட எந்த பதிவகளும் (சட்டபூர்வமான தேவைகள் தவிர) வெளியிடப்படமாட்டது என்ற உறுதிமொழியின் பெயரில் இந்த ஆராய்ச்சிலிருந்து கிடைக்கப்பெறும் முடிவுகளை வெளியிட மறுப்பு தெறிவிக்கமாட்டேன் என்று உறுதியளிக்கிறேன். ☐

4. இந்த ஆராய்ச்சி, குடல் இறக்கத்திற்காக வலை வைத்து தைப்பதில் புதிய முறையினை பயன்படுத்தி அதன் பயன்பாடுகளையும், பின் விளைவுகளையும் அறியும் முயற்சி என்பதை மருத்துவர் மூலம் அறிந்து கொண்டேன். ☐
5. இந்த ஆராய்ச்சிக்கு நான் முழுமனதுடன் சம்மதிக்கின்றேன் என்றும் மேலும் ஆராய்ச்சி குழுவினர் எனக்கு அளிக்கும் அறிவுரைகளை தவறாது பின்பற்றுவேன் என்றும் உறுதியளிக்கிறேன். ☐
6. இந்த ஆராய்ச்சிக்குத் தேவைப்படும் அனைத்து மருத்துவப்பரிசோதனைகளுக்கும் ஒத்துழைப்பு தருவேன் என்று உறுதியளிக்கிறேன். ☐
7. இந்த ஆராய்ச்சிக்கு யாருடைய எற்புறுத்தலுமின்றி எனது சொந்த விருப்பத்தின் பேரிலும் சுயஅறிவுடனும் முழுமனதுடனும் சம்மதிக்கின்றேன் என்று இதன் மூலம் ஒப்புக்கொள்கிறேன். ☐

நோயாளியின் கையொப்பம் / பெருவிரல் கைரேகை

இடம்: தேதி:

ஆராய்ச்சியாளரின் கையொப்பம்:

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MASTER CHART

Patient details						Early post operative day[at 7th day] complication				At 1st month					At 3rd month			
SL.NO	NAME	AGE/SEX	IP NO	DIAGNOSIS	EHS classification	Pain	Cord oedema	ssi	seroma	ssi	recurrence	Cord oedema	Pain	Sensory loss	Pain	Cord oedema	recurrance	Sensory loss
	Kamalakannan	36/m	0042	LIH[L]	PL1													
	Moideen	76/m	2662	LIH[M]	PM1													
	Munusamy	60/m	2659	LIH[M]	PM1													
	Ramesh	45/m	2286	RIH[L]	PL1	+												
	Rajesh	22/m	3699	RIH[L]	PL1													
	Sheik abdul	53/m	7928	RIH[L]	PL1													
	Ramanujan	66/m	8259	LIH[M]	PM2			+										
	Vembu	65/m	3102	LIH[L]	PL2													
	Varadhan	65/m	21261	LIH[M]	PM1													
	Elumalai	43/m	1236	LIH[L]	PL1													
	Venkadesh	35/m	4065	LIH[L]	PL1													
	Chandra sekar	52/m	6010	RIH[M]	PM1													
	Neelakandan	70/m	1413	LIH[M]	PM1													
	Kangadaren	47/m	7621	RIH[L]	PM1													
	Naina	50/m	8204	LIH[L]	PM2								+					
	Sarasu	40/f	9467	LIH[L]	PL1													
	Lakshmanan	43/m	O621	RIH[L]	PL1													
	Simmon	45/m	12739	RIH[L]	PL1													
	Suresh	31/m	13467	LIH[L]	PL1													
	Karthikeyan	42/m	14698	RIH[M]	PM1													
	Salim	45/m	15828	RIH[L]	PL1													
	Mookan	66/m	16255	RIH[M]	PM2													
	Karthik	22/m	19011	RIH[L]	PL1													
	Babu	48/m	18678	RIH[M]	PM1													
	Moorthy	53/m	2483	RIH[M]	PM1													

LIH-left inguinal hernia.RIH-right inguinal hernia.[M]-medial or direct hernia.L-lateral or indirect hernia.TIPP-trans inguinal pre peritoneal mesh repair

LICHTENSTEIN'S HERNIA REPAIR

Patient details						Early POD at 7th day					At 1st month					At 3rd month			
S NO	NAME	AGE/SEX	IP NO	DIAGNOSIS	EHS CLASSIFIC	pain	Cord oedema	Ssi	seroma	Scrotal collection	ssi	recurrence	Cord oedema	pain	Loss of sensation	Pain	Cord oedema	recurrence	Sensory loss
1	NAGALINGAM	75	33691	RIH (M)	PM1	+	+	+	+				+	+		+			
2	ANGUSAMY	60	969	LIH (M)	PM2														

3	GANESAN	67	6789	RIH (L)	PL1	+	+		+						+				
4	SENTHIL KUMAR	74	7471	RIH (M)	PM1														
5	KRISHNAMOORTHY	38	7746	RIH (L)	PL1			+											
6	JAYAMURUGAN	40	8408	LIH (L)	PL1	+	+		+						+				+
7	RAYAPPAN	50	8617	LIH (M)	PM1														
8	MADHARSU	50	8579	RIH (M)	PM2														
9	RAJKUMAR	57	8587	RIH (L)	PL1														
10	MUTHU	42	9297	RIH (L)	PL1														
11	MANOHARAN	64	5685	RIH (M)	PM2	+	+	+	+		+		+						
12	PRABAHARAN	44	10366	LIH (L)	PL1														
13	PRAKASAN	57	10344	RIH (M)	PM1										+				
14	SEKAR	45	11858	LIH (M)	PM1														
15	RAJAMANICKAM	46	12319	RIH (L)	PL1									+					+
16	GANAPATHY	70	13627	RIH (M)	PM1	+			+										
17	SAKTHIBALAM	40	13589	RIH (L)	PL1	+	+	+			+								
18	APPADURAI	56	13586	LIH (M)	PM1														
19	SHANTHI	48	14405	LIH (L)	PL1														
20	SHEER SINGH	59	15632	LIH (M)	PM1	+	+		+						+				
21	KARTHIK	26	16459	RIH (L)	PL1														

22	MUNUSAMY	60	2659	LIH (M)	PM1				+										
23	MURUGAN	56	4077	RIH (L)	PL1	+	+	+											
24	THANGAPILLAI	50	5654	RIH (L)	PL1														
25	SELVA RAJ	72	67344	LIH (M)	PM1	+	+		+										